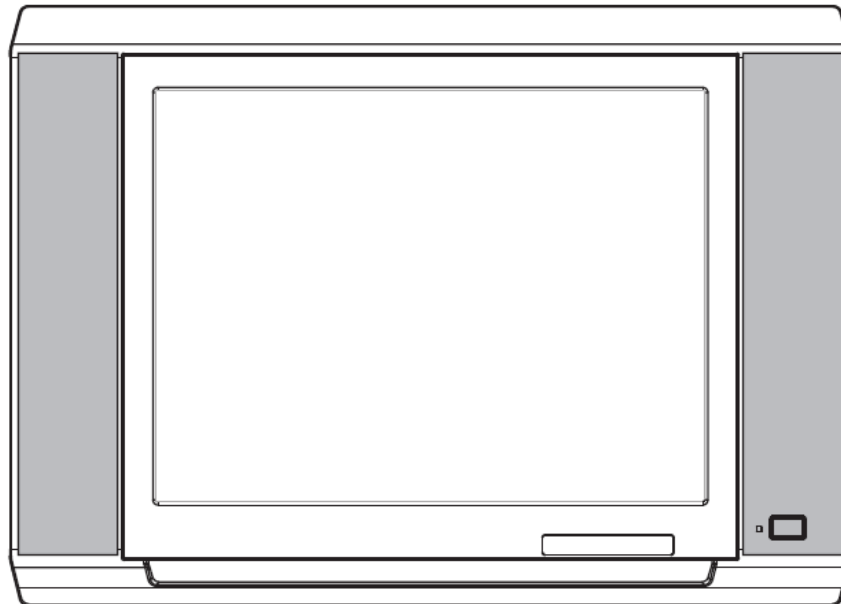


# CHASSIS MANUAL

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M123SP

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1、 Chassis feature.....	2
2、 Specifications of ICs.....	6
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This manual is the latest at the time of printing, and does not include the modification which may be made after the printing, by the constant improvement of product

TOSHIBA Integrated Circuit

# **TMPA8873CMBNG /CPBNG /CRBNG /CSBNG**

**MCU and Signal Processor for a PAL/NTSC TV**

The TMPA8873CPBNG is an integrated circuit for a PAL/NTSC TV. A MCU and a TV signal processor are integrated in a 64-pin shrink DIP package. The MCU contains 8-bit CPU, ROM, RAM, I/O ports, timer/counters, A/D converters, an on-screen display controller, remote control interfaces, IIC bus interfaces and the Closed Caption decoder. The TV signal processor contains PIF, SIF, Video, multi-standard chroma, Sync, RGB processors.

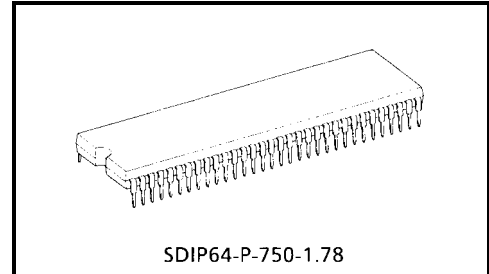
Mask ROM: TMPA8873CMBNG (ROM size: 32k)

Mask ROM: TMPA8873CPBNG (ROM size: 48k)

Mask ROM: TMPA8873CRBNG (ROM size: 56k)

Mask ROM: TMPA8873CSBNG (ROM size: 64k)

OTP ROM: TMPA8873PSBNG (ROM size: 64k)



Weight: 8.85 g (typ.)

## Features

### MCU

- High speed 8-bit CPU (TLCS-870/X series)
- Instruction execution time: 0.5  $\mu$ s (at 8 MHz)
- (TMPA8873CPBNG)
  - 48-Kbytes ROM, 2-Kbytes RAM
- ROM correction
- 12 I/O ports
- 14-bit PWM output 1 ch for a voltage synthesizer
- 7-bit PWM output 1 channel
- 8-bit A/D converter 3 ch for a touch-key input with key ON wake-up CIRCUIT
- Remote control signal preprocessor
- Two 16-bit internal timer/counter 2 ch
- Two 8-bit internal timer/counter 2 ch
- Time base timer, watchdog timer
- 16 interrupt sources: external 5, internal 11
- IIC bus interface (multi-master)
- STOP and IDLE power saving modes

### TV Processor

#### IF

- Integrated PIF VCO aligned automatically
- Negative demodulation PIF
- Multi-frequency SIF demodulator without external Tank-coil
- SIF BPF built-in
- SIF Trap filter built in

#### Video

- Integrated chroma traps
- Black stretch
- Y-gamma

#### Chroma

- Integrated chroma BPFs
- PAL/NTSC demodulation

### CCD Decoder

- Digital data slicer for NTSC

### OSD

- Clock generation for OSD display
- Font ROM characters: 384 characters
- Characters display: 32 columns  $\times$  12 lines
- Composition: 16  $\times$  18 dots
- Size of character: 3 (line by line)
- Color of character: 8 (character by character)
- Display position: H 256/V 512 steps
- BOX function
- Fringing, smoothing, Italic, underline function
- Conform to CCD REGULATION
- Jitter elimination

### RGB/Base-Band

- Integrated 1 H base-band delay line
- Base-band TINT control
- Internal OSD interface
- Half-tone and transparent for OSD
- External YCbCr interface for DVD
- RGB cut-off/drive controls by bus
- ABCL (ABL and ACL combined)

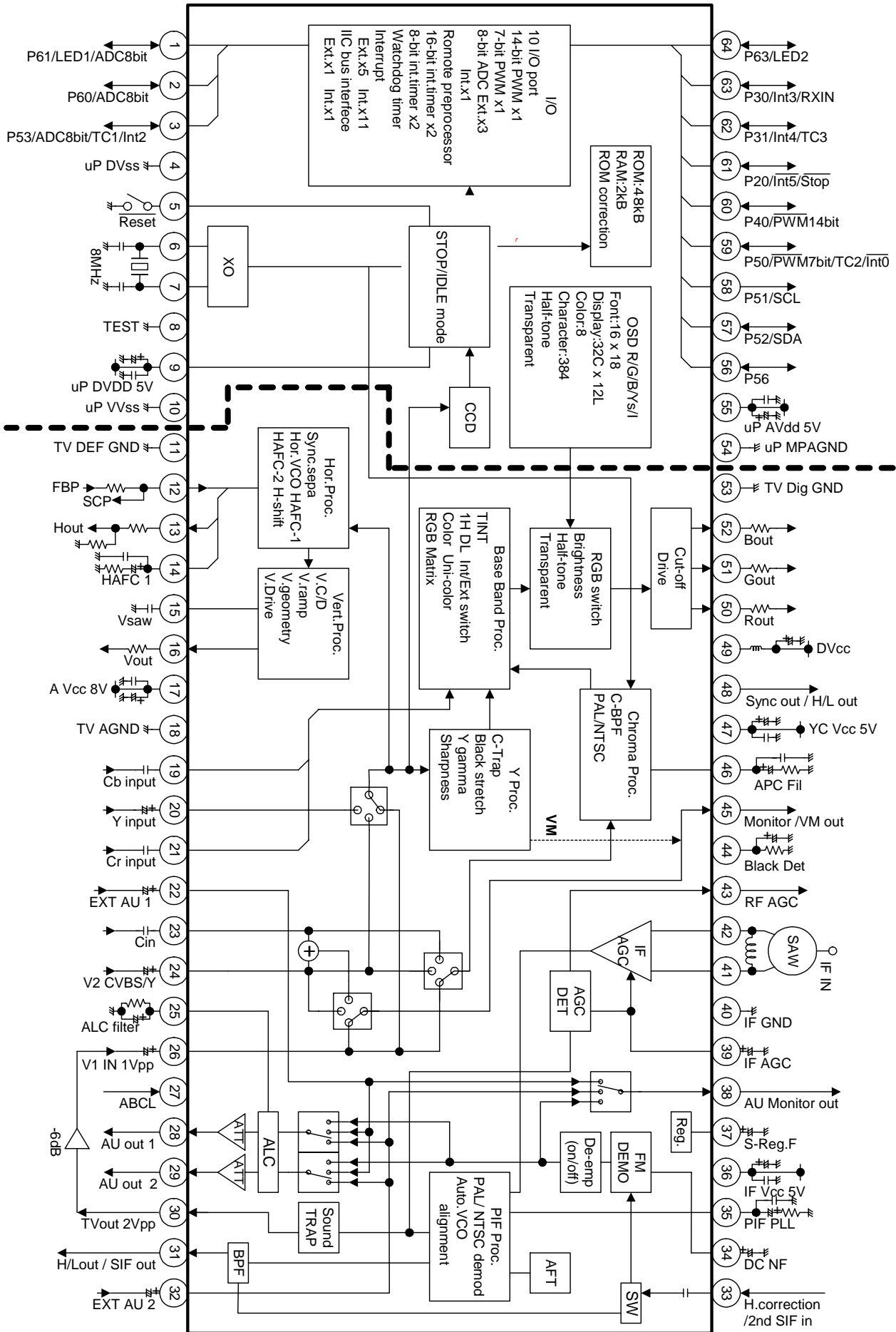
### Sync.

- Integrated  $f_H \times 640$  VCO
- DC coupled vertical ramp output (single)
- Sync output

### AV Switch

- 2 for video
- 2 for audio(mono)
  - or 1 for audio (Stereo, 2ch ATT), controlled by IIC bus
- ALC (Auto-Audio Level Control)

## Block Diagram



## Basic Structure

### 1. Internal Connections

TMPA8873 has two pieces of IC chip in one package, using Multi-Chip-Package (MCP) technology. One is a micro controller (MCU) and the other one is a signal processor (SP) for a color TV. There are some internal connections between these two ICs for handling below signals.

	Signal Name	Direction	Description
1	SCL	M to S	Internal IIC bus SCL
2	SDA	Bi-direction	Internal IIC bus SDA
3	OSD R	M to S	OSD signal connection
4	OSD G	M to S	OSD signal connection
5	OSD B	M to S	OSD signal connection
6	OSD Y/BL	M to S	OSD display control
7	OSD I, CS OUT	M to S	OSD half-tone control/Test pattern signal
8	C-Video	S to M	Composite video signal from internal video switch, for CCD
9	C-Sync	S to M	Composite sync. signal from sync. Separator, for CCD
10	HD	S to M	Horizontal timing pulse regenerated from FBP, for OSD
11	VD	S to M	Vertical timing pulse from sync. Separator, for OSD
12	CLK	M to S	8 MHz clock
13	AV <sub>DD</sub>	M to S	Reference voltage for C-Video interface
14	ADC	S to M	A/D converter monitoring RF-AGC, R-Y and B-Y

Functions of SP from MCU are controllable through the IIC bus of the internal connections.

### 2. Power Supply

TMPA8873 has some power supplies and GND pins. Power supplies related MCU must be applied at the first. Power supplies for H.VCC and TV D.VCC are the second with at least 100 ms delay after MCU power ON. The other power supplies are the last, which are recommended to be supplied from a regulator circuit using FBP.

### 3. Crystal Resonator

TMPA8873 requires only one crystal resonator, in stead that a conventional two-chip solution requires two resonators at least, one for MCU and the other one for SP. An oscillation clock with the crystal resonator of TMPA8873 is supplied for MCU operation, PIF VCO automatic alignment, alignment free AFT, chroma demodulation and horizontal oscillation. The oscillation frequency is very important so that those of functions work properly, so that designing the oscillation frequency accurately is required. The spec of crystal is recommended to be within

$f_{osc}$ : 8 MHz  $\pm$ 20 ppm

$f_{temp}$ : 8 MHz  $\pm$ 40 ppm (–20°C to +65°C)

While RESET of MCU is active, the MCU function stops. Hardware and software initialization sequence including power supplies control is required, because status of any hardware after the RESET period is unknown especially horizontal oscillator which is a very basic timing generator of SP operation.

## TERMINAL INTERFACE

## MCU BLOCK

Pin No.	Pin Name	I/O	Function	Interface Circuit
1	P61 (/KWU5) (AIN5) (LED1)	I/O (Input) (Input) (Output)	Key on wake up input A/D converter analog input LED output	
2	P60 (/KWU4) (AIN4)	I/O (Input) (Input)	Key on wake up input A/D converter analog input	
3	P53 (/KWU0) (AIN0) (TC1) (INT2) (SCK1)	I/O (Input) (Input) (Input) (Input) (I/O)	Key on wake up input A/D converter analog input Timer/counter input External interrupt input SIO serial clock input / output	
4	up DVss	Power Supply	GND	—
5	Reset	I/O	Reset signal input or watchdog timer output Address trap reset output System clock reset output	

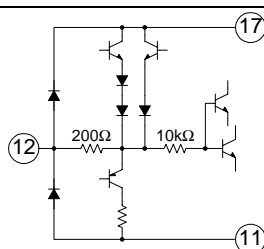
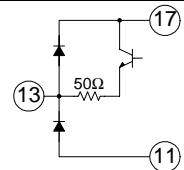
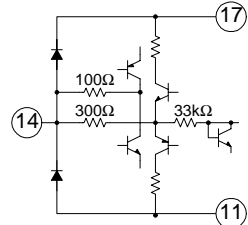
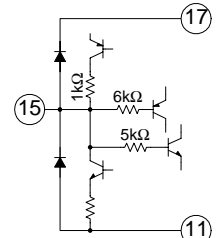
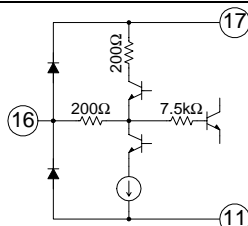
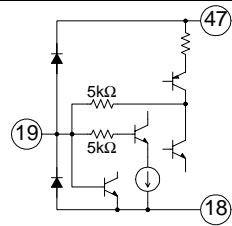
Pin No.	Pin Name	I/O	Function	Interface Circuit
6 7	Xout Xin	Output Input	X'tal connecting pins	
8	TEST	Input	Test pin for out-going test	
9	up DVdd	Power Supply	Vdd Supply 5V	
10	up VVss	Power Supply	GND for Slicer circuit	—
54	up AGND	Power Supply	GND for Oscillator circuit	—
55	up AVdd	Power Supply	Vdd for Oscillator circuit Supply 5V	—
56	P56	I/O		
57	P52 (SDA) (SO1)	I/O (I/O) (Output)	IIC bus serial data input / output SIO serial data output	

Pin No.	Pin Name	I/O	Function	Interface Circuit
58	P51 (SCL) (SI1)	I/O (I/O) (Input)	IIC bus serial clock input / output SIO serial data input	
59	P50 (/PWM8) (TC2) (INT0)	I/O (Output) (Input) (Input)	7-bit D/A conversion (PWM) output Timer/Counter input External interrupt input	
60	P40 (/PWM0)	I/O (Output)	14/12-bit D/A conversion (PWM) output	
61	P20 (/INT5) (/STOP)	I/O (Input) (Input)	External interrupt input STOP mode release signal input	
62	P31 (INT4) (TC3)	I/O (Input) (Input)	External interrupt input Timer/Counter input	



Pin No.	Pin Name	I/O	Function	Interface Circuit
63	P30 (INT3) (RXIN)	I/O (Input) (Input)	External interrupt input Remote control signal preprocessor input	
64	P63 (LED2)	I/O (Output)	LED output	

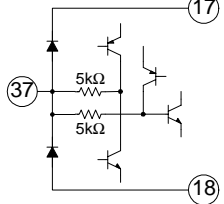
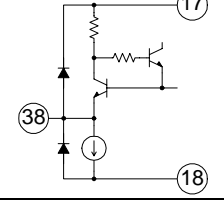
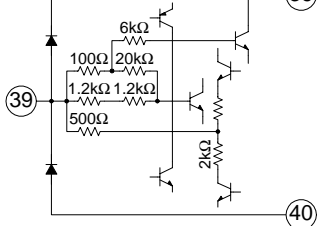
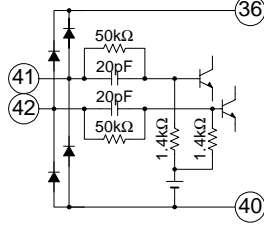
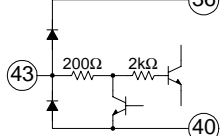
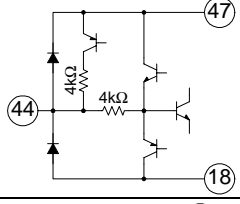
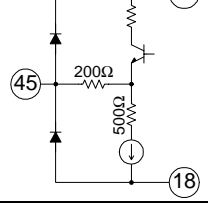
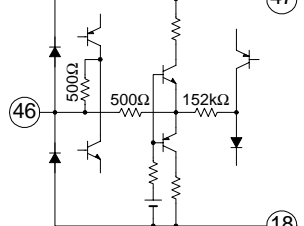
# SIGNAL PROCESSOR BLOCK

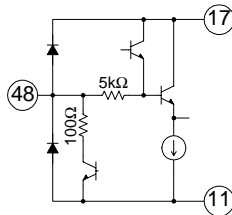
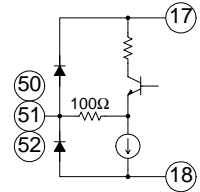
Pin No.	Pin Name	Function	Interface Circuit	I/O Signal
11	TV DEF AGND	GND terminal for TV DEF block.	—	—
12	FBP in	Input terminal for FBP.		
13	H out	Output terminal for Horizontal driving pulse.		
14	HAFC 1	Terminal to be connected capacitor for H AFC filter. This terminal voltage controls H VCO frequency.		
15	V saw	Terminal to be connected capacitor to generate V saw signal. V saw amplitude is kept constant by V AGC function.		
16	V out	Output terminal for Vertical driving pulse.		
17	AVcc 8V	Vcc terminal for DEF, RGB, Audio out and PIF out circuit. Supply 8V.	—	—
18	TV A GND	GND terminal for TV block.	—	—
19	Cb in	Input terminal for Cb signal.		

*Tentative*

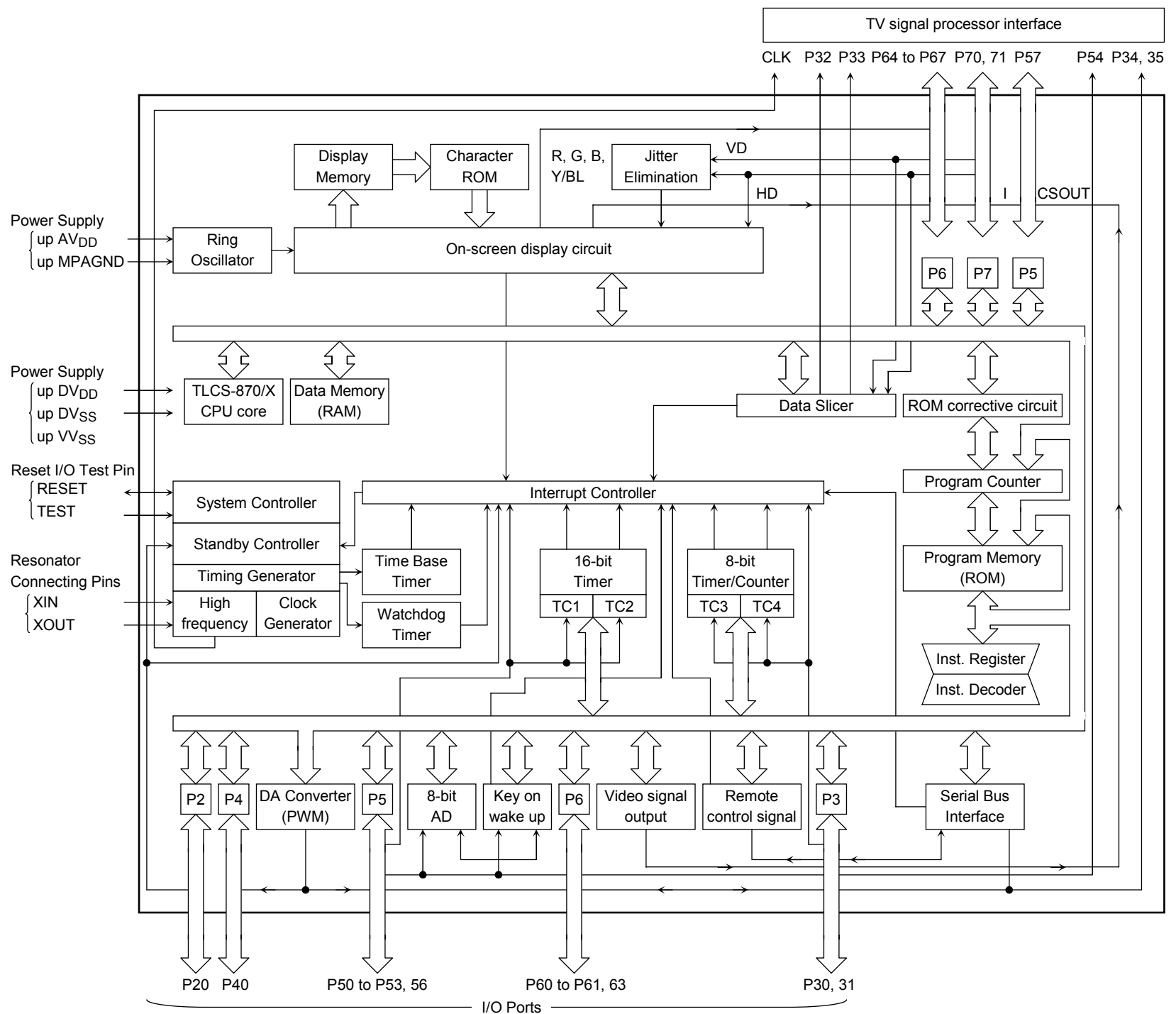
Pin No.	Pin Name	Function	Interface Circuit	70 Signal
20	Y in	Input terminal for Y signal.		
21	Cr in	Input terminal for Cr signal.		
22	Ext Au1	Input terminal for Audio signal 1.		
23	C in	Input terminal for Chroma signal.		
24	V2 in	Input terminal for Video signal.		
25	ALC filter	Terminal to be connected capacitor for ALC (Audio Level Control).		
26	V1 in	Input terminal for Video signal. (Input level = 1 Vp-p)		
27	ABCL	Input terminal for ABL/ACL control.		

Pin No.	Pin Name	Function	Interface Circuit	I/O Signal
28	Au out 1	Output terminal 1 for Audio signal.		
29	Au out 2	Output terminal 2 for Audio signal.		
30	TV out	Output terminal for detected PIF signal.		
31	1bit DAC /SIF out	Output terminal for 1bit DAC or detected SIF signal.		
32	Ext Au2 in	Input terminal for Audio signal 1.		
33	H correc / SIF in	Input terminal for H correction and 2nd SIF.		
34	DC NF	Terminal to be connected capacitor for DC Negative Feedback from SIF Det output.		
35	PIF PLL	Terminal to be connected with loop filter for PIF PLL. This terminal voltage is controlled PIF VCO frequency.		
36	IF Vcc 5V	Vcc terminal for IF circuit. Supply 5V.		—

Pin No.	Pin Name	Function	Interface Circuit	I/O Signal
37	Reg Fil	Terminal to be connected capacitor for stabilizing internal bias.		
38	AUDIO Monitor out	Output terminal for External audio signal or TV audio signal selected by BUS (Audio SW).		
39	IF AGC	Terminal to be connected with IF AGC filter.		
40	IF GND	GND terminal for IF circuit.		—
41 42	IF in	Input terminals for IF signals. Pin41 and Pin42 are both input poles of differential amplifier.		
43	RF AGC	Output terminal for RF AGC control level.		
44	Black Det	Terminal to be connected with Black Det filter for black stretch.		
45	SVM / Monitor	Output terminal for monitor function. Also output terminal for SVM signal. Selectable through IIC bus		
46	APC filter	Terminal to be connected with APC filter for Chroma demodulation. This terminal voltage controls frequency of VCXO.		

Pin No.	Pin Name	Function	Interface Circuit	I/O Signal
47	YC Vcc 5V	Vcc terminal for Y/C circuit. Supply 5V.	—	—
48	Sync out	Output terminal for Sync pulse. A pull up resistor is required because of its open collector output. (Pull up resistor: minimum 4.7kohm)		
49	DVCC	Vcc terminal for Digital block. This terminal voltage is clipped about 3.3V by regulator circuit. Supply DVCC voltage from A VCC 8V(#17) voltage via 270Ω.	—	—
50	R out	Output terminal for R signal.		
51	G out	Output terminal for G signal.		
52	B out	Output terminal for B signal.		
53	TV DGND	GND terminal for digital block.	—	—

Microcontrollers Descriptions (MROM version: TMPA8873CMBNG /CPBNG /CRBNG /CSBNG)



# TDA4864J; TDA4864AJ

## Vertical deflection booster

Rev. 01 — 12 August 2004

Product data sheet

## 1. General description

The TDA4864J and TDA4864AJ are deflection boosters for use in vertical deflection systems for frame frequencies up to 200 Hz.

The TDA4864J needs a separate flyback supply voltage, so the supply voltages are independently adjustable to optimize power consumption and flyback time.

For the TDA4864AJ the flyback supply voltage will be generated internally by doubling the supply voltage and therefore a separate flyback supply voltage is not needed.

Both circuits provide differential input stages.

## 2. Features

- Power amplifier with differential inputs
- Output current up to 2.5 A (p-p)
- High vertical deflection frequency up to 200 Hz
- High linear sawtooth signal amplification
- Flyback generator:
  - ◆ TDA4864J: separate adjustable flyback supply voltage up to 60 V
  - ◆ TDA4864AJ: internally doubled supply voltage (two supply voltages only for DC-coupled outputs).

## 3. Quick reference data

**Table 1: Quick reference data**  
Measurements referenced to pin GND.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V <sub>P1</sub>	supply voltage 1		9	-	30	V
V <sub>P2</sub>	supply voltage 2 for vertical output		V <sub>P1</sub> - 1	-	60	V
V <sub>FB</sub>	flyback supply voltage of TDA4864J		V <sub>P1</sub> - 1	-	60	V
V <sub>P3</sub>	flyback generator output voltage of TDA4864AJ	I <sub>VOU</sub> T = -1.25 A	0	-	V <sub>P1</sub> + 2.2	V
V <sub>i</sub>	input voltage on					
	pin INN		1.6	-	V <sub>P1</sub> - 0.5	V
	pin INP		1.6	-	V <sub>P1</sub> - 0.5	V
I <sub>P1</sub>	supply current 1	during scan	-	6	10	mA



**Table 1: Quick reference data ...continued**  
Measurements referenced to pin GND.

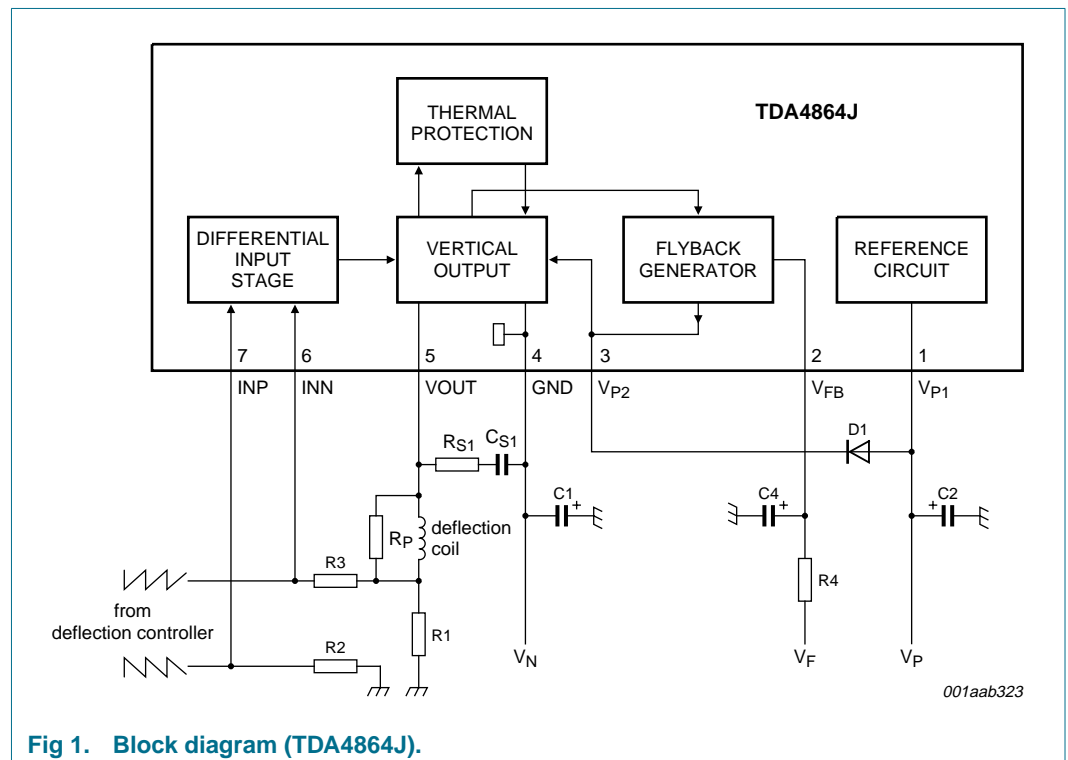
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$I_{P2}$	quiescent supply current 2	$I_{VOUT} = 0$	-	25	60	mA
$I_{VOUT(p-p)}$	vertical deflection output current (peak-to-peak value)		-	-	2.5	A
$T_{amb}$	ambient temperature		-20	-	+75	°C

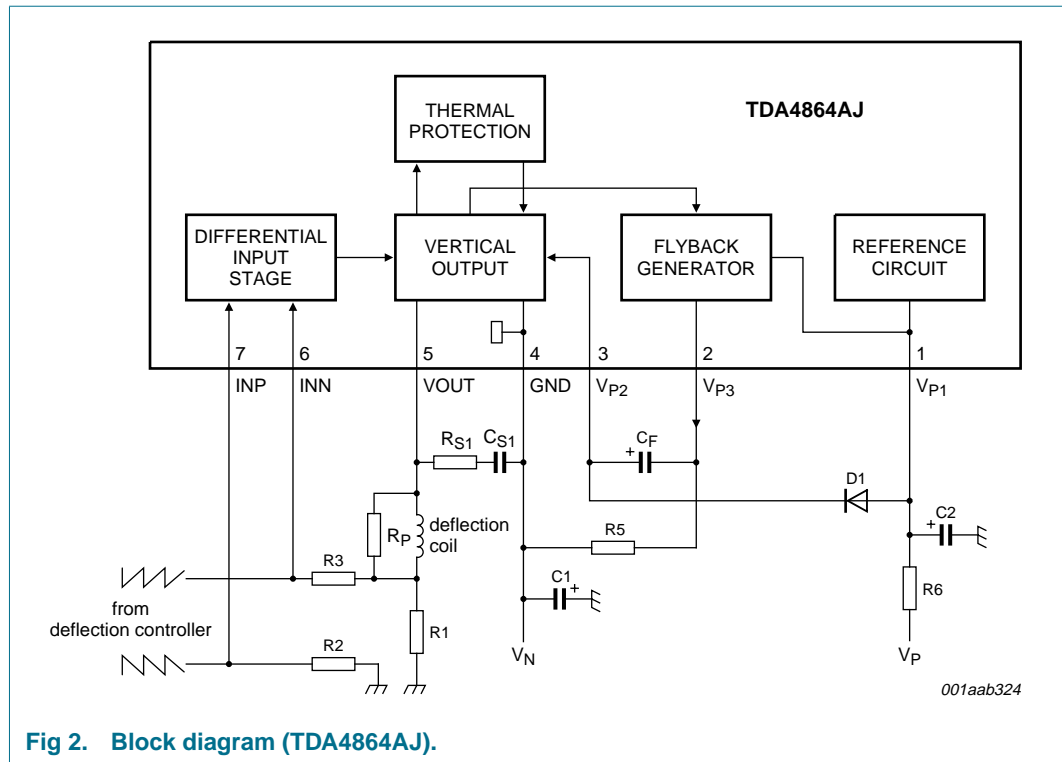
## 4. Ordering information

**Table 2: Ordering information**

Type number	Package		
	Name	Description	Version
TDA4864J	DBS7P	plastic DIL-bent-SIL power package; 7 leads	SOT524-1
TDA4864AJ		(lead length 12/11 mm); exposed die pad	

## 5. Block diagram





## 6. Pinning information

### 6.1 Pinning

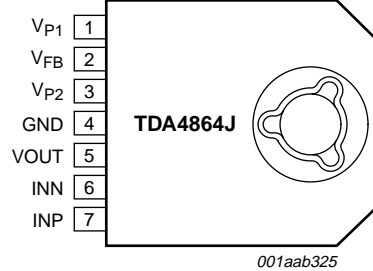


Fig 3. Pin configuration (TDA4864J).

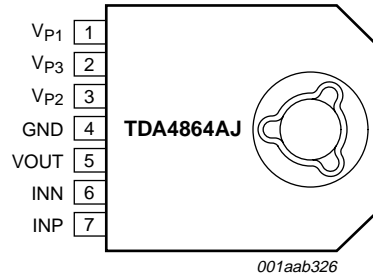


Fig 4. Pin configuration (TDA4864AJ).

### 6.2 Pin description

Table 3: Pin description

Symbol	Pin		Description
	TDA4864J	TDA4864AJ	
V <sub>P1</sub>	1	1	positive supply voltage 1
V <sub>FB</sub>	2	-	flyback supply voltage
V <sub>P3</sub>	-	2	flyback generator output
V <sub>P2</sub>	3	3	supply voltage 2 for vertical output
GND	4	4	ground or negative supply voltage
VOUT	5	5	vertical output
INN	6	6	inverted input of differential input stage
INP	7	7	non-inverted input of differential input stage

## 7. Functional description

Both the TDA4864J and TDA4864AJ consist of a differential input stage, a vertical output stage, a flyback generator, a reference circuit and a thermal protection circuit.

The TDA4864J operates with a separate flyback supply voltage (see [Figure 1](#)) while the TDA4864AJ generates the flyback voltage internally by doubling the supply voltage (see [Figure 2](#)).

### 7.1 Differential input stage

The differential sawtooth input current signal (from the deflection controller) is connected to the inputs (inverted signal to pin INN and non-inverted signal to pin INP). The vertical feedback signal is superimposed on the inverted signal on pin INN.

### 7.2 Vertical output and thermal protection

The vertical output stage is a quasi-complementary class-B amplifier with a high linearity.

The output stage is protected against thermal overshoots. For a junction temperature of  $T_j > 150\text{ }^{\circ}\text{C}$  the protection will be activated and will reduce the deflection current ( $I_{\text{VOUT}}$ ).

### 7.3 Flyback generator

The flyback generator supplies the vertical output stage during flyback.

The TDA4864J is used with a separate flyback supply voltage to achieve a short flyback time with minimized power dissipation.

The TDA4864AJ needs a capacitor ( $C_F$ ) connected between pins  $V_{P3}$  and  $V_{P2}$  (see [Figure 2](#)). Capacitor  $C_F$  is charged during scan, using the external diode D1 and resistor R5. During flyback the cathode of capacitor  $C_F$  is connected to the positive supply voltage and the flyback voltage is then twice the supply voltage. For the TDA4864AJ the resistor R6 in the positive supply line can be used to reduce the power consumption.

In parallel with the deflection coil a damping resistor  $R_P$  and an RC combination ( $R_{S1} = 5.6\text{ }\Omega$  and  $C_{S1} = 100\text{ nF}$ ) are needed. Furthermore, another additional RC combination ( $R_{S2} = 5.6\text{ }\Omega$  and  $C_{S2} = 47\text{ nF to }150\text{ nF}$ ) can be used to minimize the noise effect and the flyback time (see [Figure 7](#) and [8](#)).

## 8. Internal circuitry

Table 4: Internal circuitry

Pin	Symbol	Internal circuits
TDA4864J		
1	V <sub>P1</sub>	<p><b>TDA4864J</b></p> <p>001aab328</p>
2	V <sub>FB</sub>	
3	V <sub>P2</sub>	
4	GND	
5	V <sub>OUT</sub>	
6	INN	
7	INP	
TDA4864AJ		
1	V <sub>P1</sub>	<p><b>TDA4864AJ</b></p> <p>001aab329</p>
2	V <sub>P3</sub>	
3	V <sub>P2</sub>	
4	GND	
5	V <sub>OUT</sub>	
6	INN	
7	INP	

## 9. Limiting values

**Table 5: Limiting values**

In accordance with the Absolute Maximum Rating System (IEC 60134). Voltages referenced to pin GND; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Max	Unit
V <sub>P1</sub>	supply voltage 1		-	40	V
V <sub>P2</sub>	supply voltage 2		-	60	V
V <sub>FB</sub>	flyback supply voltage of TDA4864J		-	60	V
V <sub>P3</sub>	flyback generator output voltage of TDA4864AJ		0	V <sub>P1</sub> + 3	V
V <sub>i</sub>	input voltage on				
	pin INN		-	V <sub>P1</sub>	V
	pin INP		-	V <sub>P1</sub>	V
V <sub>O(VOUT)</sub>	output voltage on pin VOUT		-	62	V
I <sub>P2</sub>	supply current 2		-	±1.5	A
I <sub>O(VOUT)</sub>	output current on pin VOUT	[1]	-	±1.5	A
I <sub>VFB</sub>	current during flyback of TDA4864J		-	±1.5	A
I <sub>VP3</sub>	current during flyback of TDA4864AJ		-	±1.5	A
T <sub>stg</sub>	storage temperature		-25	+150	°C
T <sub>amb</sub>	ambient temperature		-20	+75	°C
T <sub>j</sub>	junction temperature	[1]	-	150	°C
V <sub>esd</sub>	electrostatic discharge voltage on all pins	[2]	-300	+300	V

[1] Internally limited by thermal protection; will be activated for T<sub>j</sub> ≥ 150 °C.

[2] Equivalent to discharging a 200 pF capacitor through a 0 Ω series resistor.

## 10. Thermal characteristics

**Table 6: Thermal characteristics**

Symbol	Parameter	Conditions	Typ	Unit
R <sub>th(j-mb)</sub>	thermal resistance from junction to mounting base	[1]	6	K/W

[1] To minimize the thermal resistance from mounting base to heatsink [R<sub>th(mb-h)</sub>] follow the recommended mounting instruction: screw mounting preferred; torque = 40 Ncm; use heatsink compound; isolation plate increases R<sub>th(mb-h)</sub>.

## 11. Characteristics

**Table 7: Characteristics**

$V_{P1} = 25\text{ V}$ ;  $T_{amb} = 25\text{ }^{\circ}\text{C}$ ; voltages referenced to pin GND; unless otherwise specified.

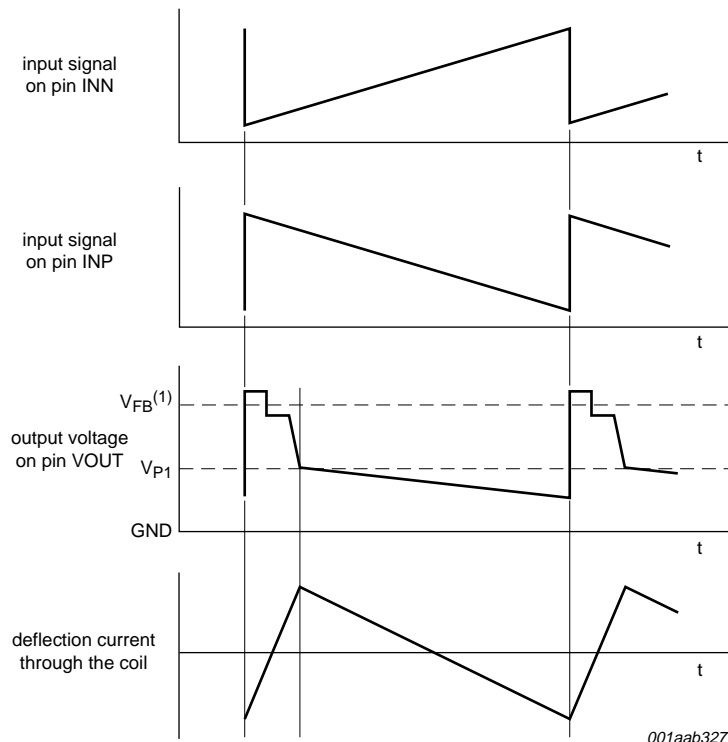
Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Supplies</b>						
$V_{P1}$	supply voltage 1		9	-	30	V
$V_{P2}$	supply voltage 2		$V_{P1} - 1$	-	60	V
$V_{FB}$	flyback supply voltage of TDA4864J		$V_{P1} - 1$	-	60	V
$V_{P3}$	flyback generator output voltage of TDA4864AJ	$I_{VOUT} = -1.25\text{ A}$	0	-	$V_{P1} + 2.2$	V
$I_{P1}$	supply current 1	during scan	-	6	10	mA
$I_{P2}$	quiescent supply current 2	$I_{VOUT} = 0$	-	25	60	mA
<b>Differential input stage</b>						
$V_i$	input voltage on					
	pin INN		1.6	-	$V_{P1} - 0.5$	V
	pin INP		1.6	-	$V_{P1} - 0.5$	V
$I_q$	input quiescent current on					
	pin INN		-	-100	-500	nA
	pin INP		-	-100	-500	nA
<b>Flyback generator</b>						
$I_{VFB}$	current during flyback of TDA4864J		-	-	$\pm 1.5$	A
$I_{VP3}$	current during flyback of TDA4864AJ		-	-	$\pm 1.5$	A
$V_{VP2-VFB}$	voltage drop during flyback of TDA4864J					
	reverse	$I_{VOUT} = -1\text{ A}$	-	-1.5	-	V
		$I_{VOUT} = -1.25\text{ A}$	-	-2	-	V
	forward	$I_{VOUT} = 1\text{ A}$	-	2.2	-	V
		$I_{VOUT} = 1.25\text{ A}$	-	2.5	-	V
$V_{VP3-VP1}$	voltage drop during flyback of TDA4864AJ					
	reverse	$I_{VOUT} = -1\text{ A}$	-	-1.5	-	V
		$I_{VOUT} = -1.25\text{ A}$	-	-2	-	V
	forward	$I_{VOUT} = 1\text{ A}$	-	2.2	-	V
		$I_{VOUT} = 1.25\text{ A}$	-	2.5	-	V
<b>Vertical output stage; see Figure 5</b>						
$I_{VOUT}$	vertical deflection output current		-	-	$\pm 1.25$	A
$I_{VOUT(p-p)}$	vertical deflection output current (peak-to-peak value)		-	-	2.5	A
$V_{o(sat)n}$	output saturation voltage to ground	$I_{VOUT} = 1\text{ A}$	-	1.4	1.7	V
		$I_{VOUT} = 1.25\text{ A}$	-	1.8	2.3	V

**Table 7: Characteristics ...continued**

$V_{P1} = 25 \text{ V}$ ;  $T_{amb} = 25^\circ\text{C}$ ; voltages referenced to pin GND; unless otherwise specified.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
$V_{o(sat)p}$	output saturation voltage to $V_{P2}$	$I_{VOUT} = 1 \text{ A}$	-2.3	-2	-	V
		$I_{VOUT} = 1.25 \text{ A}$	-2.8	-2.3	-	V
LIN	non-linearity of output signal	[1]	-	-	1	%

[1] Deviation of the output slope at a constant input slope.



(1)  $V_{FB}$  for TDA4864J;  $2V_{P1}$  for TDA4864AJ.

**Fig 5. Timing diagram.**



## 12. Application information

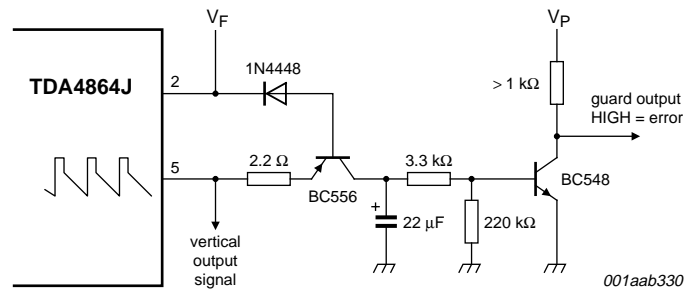
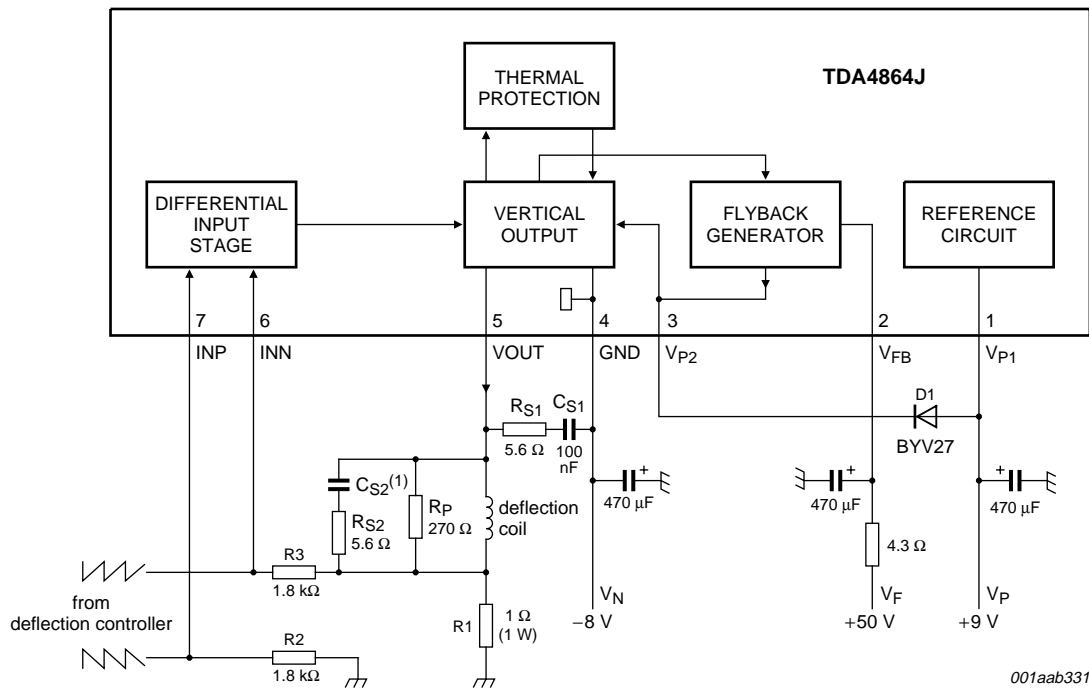


Fig 6. Application circuit with TDA4864J for external guard signal generation.



**Attention: the heatsink of the IC must be isolated against ground of the application (it is connected to pin GND).**

- (1) With  $C_{S2}$  (typical value between 47 nF and 150 nF) the flyback time and the noise behavior can be optimized.

Fig 7. Application circuit with TDA4864J.



- (1) With  $C_{S2}$  (typical value between 47 nF and 150 nF) the flyback time and the noise behavior can be optimized.
- (2) With  $R5$  capacitor  $C_F$  will be charged during scan and the value (typical value between 150  $\Omega$  and 270  $\Omega$ ) depends on  $I_{defl}$ ,  $t_{lib}$  and  $C_F$ .
- (3)  $R6$  reduces the power dissipation of the IC. The maximum possible value depends on the application.

**Fig 8. Application circuit with TDA4864AJ.**

**Table 8: Values given from application**

[1] For TDA4864J only.

# BOM LIST

Item No.	Description	Qty	unit	Positon
T6-OR1036-P007X	REMOTE CONTROL ASSB	1	PC	
11-0BC337-0BX	TRANSISTOR (NPN) BC337-40	1	PC	Q1501
13-C73C03-02B	IC SC73C0302	1	PC	IC1501
14-IRE05B-XX0	IR EMITTING DIODE TSAL6200	1	PC	D1501
18-CB0221-JNX	RES. C.F. 220 OHM 1/6W +/-5%	1	PC	R1502
18-CB0229-JNX	RES. C.F. 2.2 OHM 1/6W +/-5%	1	PC	R1501
25-HBB479-M1X	CAP. ELEC 4.7 UF 10V +/-20%	1	PC	C1504
26-EBP101-JCS	CAP. CER 100 PF 50V +/-5%	1	PC	C1502
26-EBP101-JCS	CAP. CER 100 PF 50V +/-5%	1	PC	C1501
26-EBP104-ZFS	CAP. CER 0.1UF 50V +80%/-20%	1	PC	C1503
40-UOCASR-RMB1X	P.C.B. REMOTE HANDSET BD	1	PC	
41-WJ0120-B00	WIRE BARE JUMPER 12MM	1	PC	J1501
45-COS455-KY1	CERAMIC RESONATOR 455KHZ	1	PC	X1501
67-X38064-0E2	BATTERY SPRING (+/-)	1	PC	
67-X38065-0E2	BATTERY SPRING (+)	1	PC	
67-X38066-0E2	BATTERY SPRING (-)	1	PC	
74-007026-60C	POLYBAG (70MMX260MMX0.06MM)	1	PC	
T6-OR1036-P007XZ	REMOTE CONTROL ART DESIGN ASSB	1	PC	
49-HS36R1-00XHA	RUBBER PAD KEYS	1	PC	
55-HS36RB-1HA5B	LOWER CASE - REMOTE HANDSET	1	PC	
55-HS36RD-0HA5B	BATT. DOOR - REMOTE HANDSET	1	PC	
55-HS36RT-1HA1A	UPPER CASE - REMOTE HANDSET	1	PC	
58-HS36R2-PUI1A	INLAY REMOTE HANDSET	1	PC	
T8-2131SGP-FCN	F.CAB ASSB	1	PC	
02-GND021-LX0	ASS' Y-GND BRAID 21 "CRT	1	PC	
36-DEG210-XX1	DEGAUSSING COIL 2500MM	1	PC	
42-51208D-XX1	SPEAKER 8 OHM 5W (52MMX120MM)	1	PC	W602
42-51208D-XX1	SPEAKER 8 OHM 5W (52MMX120MM)	1	PC	W601
46-13902H-02X	HS 2P 2468#22 360 S11-2Y/7MM	1	PC	FOR P603
46-27250H-02X	HS 2P24 450/5 F/W TJC3-02H	1	PC	FOR P604
54-113970-0U0	PVC TUBE AWG NO.5	0.32	M	FOR SPK WIRE
54-114000-00X	FELT TAPE (150MMX19MMX0.3MM)	4	PC	
54-205140-000	SPACER CRT MOUNTING T=2MM	4	PC	MTG CRT & F. CAB
57-10654X-00F	TWIST TIE NY66	10	PC	
59-130460-00X	RUBBER PAD (25MMX7MM)	2	PC	FOR FRONT CAB. (FOOTING)
62-312090-0HA	POWER KNOB ABS-LG H121 (HB)	1	PC	
62-406120-0UN	TRACK	1	PC	
63-B30080-AB4	S/T SCREW B 3 X 8 AB	3	PC	MTG KEY BD & PUSH BUTTON
63-B40150-AB4	S/T SCREW B 4 X 15 AB	12	PC	MTG CRT BRACKET & F. CAB
63-S30100-AB4	S/T SCREW S 3 X 10 AB	1	PC	MTG RECEIVER BD & F. CAB.
63-W30100-AB4	S/T SCREW W 3 X 10 AB	8	PC	MTG SPK & FRONT CAB.
63-W30100-AB4	S/T SCREW W 3 X 10 AB	2	PC	MTG PUSH BUTTON & F. CAB.
63-W30100-AB4	S/T SCREW W 3 X 10 AB	1	PC	MTG LENS & F. CAB.
65-A60200-20E	WASHER 6 X 20 X 2MM	4	PC	MTG CRT TO F. CAB
65-Z60100-50E	NUT M 6	4	PC	MTG CRT TO F. CAB
67-325570-3E0	CRT BRACKET	4	PC	MTG CRT Z=36.0MM吋
67-X12668-0E0	SPRING CRT 6MMX40MMX0.5MM	1	PC	
67-X39732-0E2	POWER SPRING	1	PC	
T8-2131SGP-FCNZ	F.CAB ART DESIGN ASSB	1	PC	
55-DA31FC-0CN1A	FRONT CABINET	1	PC	
56-C276FB-0HA5G	PUSH BUTTON	1	PC	
56-C276LS-0HC5Z	LENS	1	PC	
56-D276PK-0HA5G	POWER KNOB	1	PC	
67-2960LG-1A0AA	LOGO	1	PC	
T8-2131SGP-MANSM	M. BD SKD	1	PC	
T8-2131SGP-KEY	KEY BD ASSB	1	PC	
18-CB0152-JNX	RES. C.F. 1.5K OHM 1/6W +/-5%	1	PC	R1405
18-CB0182-JNX	RES. C.F. 1.8K OHM 1/6W +/-5%	1	PC	R1420
18-CB0272-JNX	RES. C.F. 2.7K OHM 1/6W +/-5%	1	PC	R1421
18-CB0432-JNX	RES. C.F. 4.3K OHM 1/6W +/-5%	1	PC	R1407
18-CB0682-JNX	RES. C.F. 6.8K OHM 1/6W +/-5%	1	PC	R1406
40-21166F-KEB	P.C.B. KEY BD	1	PC	

# BOM LIST

41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	J1422
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	J1421
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	J1420
46-35110H-03X	HS 3P 2468#24 700 TJC3-3Y/JC25-3Y	1	PC	P1401 FOR M. BD P001
48-TAC001-XX0	TACT SWITCH	1	PC	S1401
48-TAC001-XX0	TACT SWITCH	1	PC	S1402
48-TAC001-XX0	TACT SWITCH	1	PC	S1403
48-TAC001-XX0	TACT SWITCH	1	PC	S1404
48-TAC001-XX0	TACT SWITCH	1	PC	S1405
48-TAC001-XX0	TACT SWITCH	1	PC	S1406
T8-2131SGP-MANHM	M. BD ASSB	1	PC	
T8-2131SGP-MAN	M. BD ASSB	1	PC	
07-457FF5-NA9G	TUNER F07GP-4ND-E	1	PC	TU101
09-38B3V9-DTX	SMD. DIODE BZX384B3V9	1	PC	D001
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D301
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D401
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D402
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D403
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D406
10-1N4002-EBX	DIODE 1N4002 (RECTIFIER)	1	PC	D405
10-1N4002-EBX	DIODE 1N4002 (RECTIFIER)	1	PC	D424
10-1N4002-EBX	DIODE 1N4002 (RECTIFIER)	1	PC	D425
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D002
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D206
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D302
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D303
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D305
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D307
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D412
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D413
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D420
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D422
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D423
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D600
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D601
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D602
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D603
10-79B20V-DBX	DIODE BZX79BXXX	1	PC	D421
10-79C3V9-DBX	DIODE ZENER 3V9 1/2W 5%	1	PC	D304
10-79C3V9-DBX	DIODE ZENER 3V9 1/2W 5%	1	PC	D411
10-79C5V1-DBX	DIODE ZENER 5V1 1/2W 5%	1	PC	D204
10-79C5V1-DBX	DIODE ZENER 5V1 1/2W 5%	1	PC	D216
10-79C6V2-DBX	DIODE ZENER 6V2 1/2W 5%	1	PC	D207
10-CW574C-DJX	DIODE CW574CD	1	PC	D101
11-KTD863-0BX	TRANSISTOR KTD863	1	PC	Q401
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q602
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q601
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q421
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q208
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q006
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q605
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q907
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q951
12-BC857A-0BX	SMD TRANSISTOR BC857A (PNP)	1	PC	Q003
12-BC857A-0BX	SMD TRANSISTOR BC857A (PNP)	1	PC	Q207
12-BC857A-0BX	SMD TRANSISTOR BC857A (PNP)	1	PC	Q210
12-BC857A-0BX	SMD TRANSISTOR BC857A (PNP)	1	PC	Q420
12-BC857A-0BX	SMD TRANSISTOR BC857A (PNP)	1	PC	Q603
12-BC857A-0BX	SMD TRANSISTOR BC857A (PNP)	1	PC	Q604
13-24LC08-BNB	IC EEPROM 24LC08BN(WRITE)	1	PC	IC001
13-HCF405-3BB	IC HCF4053BM1	1	PC	IC901
13-LD1117-50B	5.0V IC LD1117S50TR	1	PC	IC402
13-LD1117-50B	5.0V IC LD1117S50TR	1	PC	IC002

# BOM LIST

13-PA8873-PSPB	IC TMPA8873PSBNG(WRITE)	1	PC	IC201
13-TDA486-4AS	IC TDA4864AJ	1	PC	IC301
13-TEA202-5BP	IC TEA2025B2X2W	1	PC	IC601
18-CB0101-JMX	RES. C. F. 100 OHM 1/6W +/-5%	1	PC	R009
18-CB0102-JMX	RES. C. F. 1K OHM 1/6W +/-5%	1	PC	R415
18-CB0102-JNX	RES. C. F. 1K OHM 1/6W +/-5%	1	PC	R007
18-CB0103-JNX	RES. C. F. 10K OHM 1/6W +/-5%	1	PC	R012
18-CB0103-JNX	RES. C. F. 10K OHM 1/6W +/-5%	1	PC	R406
18-CB0222-JNX	RES. C. F. 2.2K OHM 1/6W +/-5%	1	PC	J921
18-CB0271-JNX	RES. C. F. 270 OHM 1/6W +/-5%	1	PC	R238
18-CB0272-JNX	RES. C. F. 2.7K OHM 1/6W +/-5%	1	PC	R607
18-CB0333-JNX	RES. C. F. 33K OHM 1/6W +/-5%	1	PC	R612
18-CB0471-JNX	RES. C. F. 470 OHM 1/6W +/-5%	1	PC	R401
19-AB0681-JTX	SMD. RES. 680 OHM 1/10W 0603	1	PC	R433
18-CB0472-JMX	RES. C. F. 4.7K OHM 1/6W +/-5%	1	PC	R601
18-CB0472-JMX	RES. C. F. 4.7K OHM 1/6W +/-5%	1	PC	R602
18-CB0569-JNX	RES. C. F. 5.6 OHM 1/6W +/-5%	1	PC	R317
18-CD0100-JNX	RES. C. F. 10 OHM 1/4W +/-5%	1	PC	R407
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	R027
18-CD0109-JNX	RES. C. F. 1 OHM 1/4W +/-5%	1	PC	R435
18-CD0122-JNX	RES. C. F. 1.2K OHM 1/4W +/-5%	1	PC	R311
18-CD0820-JNX	RES. C. F. 82 OHM 1/4W +/-5%	1	PC	R298
18-CE0332-JNX	RES. C. F. 3.3K OHM 1/2W +/-5%	1	PC	R410
18-DB0243-FNX	RES. M. F. 24K OHM 1/6W +/-1%	1	PC	R303
18-DB0682-FNX	RES. M. F. 1/6W 6.8K OHM +/-1%	1	PC	R244
18-EE0109-JS2	RES. FUS. 1 OHM 1/2W +/-5%	1	PC	R418
18-EE0109-JS2	RES. FUS. 1 OHM 1/2W +/-5%	1	PC	R409
18-EE0109-JS2	RES. FUS. 1 OHM 1/2W +/-5%	1	PC	R405
18-EF0478-JG2	RES. FUS. 0.47OHM1W +/-5%	1	PC	R403
18-FF0100-JGX	RES. M. O. 10 OHM 1W +/-5%	1	PC	R429
18-FF0103-JGX	RES. M. O. 10K OHM 1W +/-5%	1	PC	R309
18-FF0122-JSX	RMOF 1W +/-5% 1.2K $\Omega$	1	PC	R411
18-FF0102-JSX	RMOF 1W +/-5% 1K $\Omega$	1	PC	R408
18-FF0221-JSX	RES. M. O. F 1.0W 1.0W 220 OHM +/-5%	1	PC	R412
18-FF0271-JSX	RES. M. O. F 1.0W 270 OHM +/-5%	1	PC	R336
18-FF0129-JGX	RES. M. O. 1.2 OHM 1W +/-5%	1	PC	R421
18-FF0569-JGX	RES. M. O. F 5.6 OHM 1W +/-5%	1	PC	R304
18-FG0221-JHX	RES. M. O. 220 OHM 2W +/-5%	1	PC	R307
18-RF0109-JGX	RES. WIRE ROUND 1 OHM 1W +/-5%	1	PC	R312
19-AA0512-JTX	RES. SMD 5.1K 1/16W +/-5% 0603	1	PC	R306
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	J019
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	J324
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	J906
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	JP401
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	R437
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	R432
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	R227
19-AB0100-JTX	RES SMD 10 OHM 1/10W +/-5%	1	PC	R231
19-AB0100-JTX	RES SMD 10 OHM 1/10W +/-5%	1	PC	R917
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R249
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R208
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R916
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R915
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R604
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R603
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R207
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R103
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R102
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R047
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R028
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R005
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R001
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R954

# BOM LIST

19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R953
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R922
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R920
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R902
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R901
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R609
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R606
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R013
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R052
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R315
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R051
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R030
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R912
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R911
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R010
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R006
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R913
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R952
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R008
19-AB0104-JTX	SMD. RES 100K OHM 1/10W 0603	1	PC	R232
19-AB0104-JTX	SMD. RES 100K OHM 1/10W 0603	1	PC	R434
19-AB0104-JTX	SMD. RES 100K OHM 1/10W 0603	1	PC	R031
19-AB0105-JTX	RES SMD 1M OHM 1/10W 0603	1	PC	R221
19-AB0121-JTX	SMD. RES 120 OHM 1/10 J 0603	1	PC	R436
19-AB0152-JTX	SMD. RES 1.5K OHM 1/10W +/-5% 0603	1	PC	R222
19-AB0152-JTX	SMD. RES 1.5K OHM 1/10W +/-5% 0603	1	PC	R218
19-AB0154-JTX	SMD. RES 150K 1/10W +/-5% 0603	1	PC	R245
19-AB0183-JTX	SMD. RES 18K OHM 1/10W +/-5% 0603	1	PC	R302
19-AB0221-JTX	RES SMD 220 OHM 1/10W 0603	1	PC	R228
19-AB0221-JTX	RES SMD 220 OHM 1/10W 0603	1	PC	R203
19-AB0221-JTX	RES SMD 220 OHM 1/10W 0603	1	PC	R202
19-AB0221-JTX	RES SMD 220 OHM 1/10W 0603	1	PC	R201
19-AB0224-JTX	SMD RES 220K OHM 1/10W 0603	1	PC	R206
19-AB0271-JTX	SMD. RES 270 OHM 1/10W +/-5% 0603	1	PC	R217
19-AB0272-JTX	RES SMD 2.7K OHM 1/10W 0603	1	PC	R610
19-AB0272-JTX	RES SMD 2.7K OHM 1/10W 0603	1	PC	R608
19-AB0272-JTX	RES SMD 2.7K OHM 1/10W 0603	1	PC	R015
19-AB0272-JTX	RES SMD 2.7K OHM 1/10W 0603	1	PC	R461
19-AB0273-JTX	SMD. RES 27K OHM 1/10W +/-5%	1	PC	R216
19-AB0331-JTX	RES. SMD 330 OHM 1/10W 0603	1	PC	R430
19-AB0332-JTX	SMD RES 3.3K OHM 1/10W 0603	1	PC	R617
19-AB0332-JTX	SMD RES 3.3K OHM 1/10W 0603	1	PC	R616
19-AB0332-JTX	SMD RES 3.3K OHM 1/10W 0603	1	PC	R209
19-AB0333-JTX	RES. SMD 33K OHM 1/10W 0603	1	PC	R205
19-AB0470-JTX	RES SMD 47 OHM 1/10W +/-5%0603	1	PC	R002
19-AB0471-JTX	SMD. RES 470 OHM 1/10W +/-5%	1	PC	R924
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R003
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R004
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R029
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R900
19-AB0473-JTX	SMD. RES 47K OHM 1/10W 0603	1	PC	R936
19-AB0473-JTX	SMD. RES 47K OHM 1/10W 0603	1	PC	R927
19-AB0473-JTX	SMD. RES 47K OHM 1/10W 0603	1	PC	R926
19-AB0473-JTX	SMD. RES 47K OHM 1/10W 0603	1	PC	R937
19-AB0510-JTX	RES SMD 51 OHM 1/10W 0603	1	PC	R923
19-AB0562-JTX	SMD. RES 5.6K OHM 1/10W +/-5% 0603	1	PC	R431
19-AB0820-JTX	SMD. RES 82 OHM 1/10W +/-5% 0603	1	PC	R929
19-AB0820-JTX	SMD. RES 82 OHM 1/10W +/-5% 0603	1	PC	R905
19-AB0820-JTX	SMD. RES 82 OHM 1/10W +/-5% 0603	1	PC	R921
19-AB0820-JTX	SMD. RES 82 OHM 1/10W +/-5% 0603	1	PC	R903
19-AB0822-JTX	SMD. RES 8.2K OHM 1/10W +/-5% 0603	1	PC	R237
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C901
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C907

# BOM LIST

25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C908
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C952
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C953
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C004
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C016
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C023
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C025
25-RCB100-M1X	CAP.ELEC 10 UF 16V +/-20%	1	PC	C220
25-RCB100-M1X	CAP.ELEC 10 UF 16V +/-20%	1	PC	C227
25-RCB100-M1X	CAP.ELEC 10 UF 16V +/-20%	1	PC	C231
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C242
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C101
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C211
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C311
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C602
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C603
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C607
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C609
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C612
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C921
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C423
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C906
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C903
25-BCB101-M1X	CAP. ELEC 100 UF 16V +/-20%	1	PC	C617
25-BCB221-M1X	CAP. ELEC 220 UF 16V +/-20%	1	PC	C613
25-BCB221-M1X	CAP. ELEC 220 UF 16V +/-20%	1	PC	C610
25-BCB221-M1X	CAP. ELEC 220 UF 16V +/-20%	1	PC	C232
25-BCB221-M1X	CAP. ELEC 220 UF 16V +/-20%	1	PC	C418
25-BCB470-M1X	CAP. ELEC 47 UF 16V +/-20%	1	PC	C081
25-BCB470-M1X	CAP. ELEC 47 UF 16V +/-20%	1	PC	C202
25-BCB471-M1X	CAP. ELEC 470 UF 16V +/-20%	1	PC	C217
25-BCB471-M1X	CAP. ELEC 470 UF 16V +/-20%	1	PC	C307
25-BCB471-M1X	CAP. ELEC 470 UF 16V +/-20%	1	PC	C606
25-BDA471-M1X	CAP. ELEC 470 UF 25V +/-20%	1	PC	C308
25-BDA471-M1X	CAP. ELEC 470 UF 25V +/-20%	1	PC	C415
25-BDB102-M1X	CAP.ELEC 1000UF 25V+/-20%13*22	1	PC	C413
25-BDB470-M1X	CAP. ELEC 47 UF 25V +/-20%	1	PC	C419
25-BEB100-M1X	CAP. ELEC 10 UF 35V +/-20%	1	PC	C431
25-BEB100-M1X	CAP. ELEC 10 UF 35V +/-20%	1	PC	C441
25-BEB101-M1X	CAP. ELEC 100 UF 35V +/-20%	1	PC	C302
25-BFB101-M1X	CAP. ELEC 100 UF 50V +/-20%	1	PC	C106
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C916
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C915
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C911
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C909
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C616
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C214
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C203
25-BFB229-M1X	CAP. ELEC 2.2 UF 50V +/-20%	1	PC	C622
25-BFB229-M1X	CAP. ELEC 2.2 UF 50V +/-20%	1	PC	C623
25-RFB479-M1X	CAP.ELEC 4.7 UF 50V +/-20%	1	PC	C310
25-RFB479-M1X	CAP.ELEC 4.7 UF 50V +/-20%	1	PC	C104
25-RFB479-M1X	CAP.ELEC 4.7 UF 50V +/-20%	1	PC	C216
25-RFB479-M1X	CAP.ELEC 4.7 UF 50V +/-20%	1	PC	C304
25-BHB100-M1X	CAP. ELEC 10 UF 100V +/-20%	1	PC	C406
25-BHB100-M1X	CAP. ELEC 10 UF 100V +/-20%	1	PC	C420
25-BLA100-M1X	CAP. ELEC 10 UF 250V +/-20%	1	PC	C408
25-MFB228-K1X	CAP.ELEC 0.22UF 50V +/-10%	1	PC	C205
25-MFB478-K1X	CAP.ELEC 50V 0.47UF +/-10%	1	PC	C236
25-MFB478-K1X	CAP.ELEC 50V 0.47UF +/-10%	1	PC	C218
25-PJG101-M1X	CAP.CELE 100UF/160V/+/-20%	1	PC	C411
18-CB0470-JMX	RES. C. F. 47 OHM 1/6W +/-5%	1	PC	C404
27-MCC682-J0X	CAP.PE 6800PF 100V +/-5%	1	PC	C401

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26-AIC391-KBX	CAP. CER 390 PF 500V +/-10% B	1	PC	C412
26-AIC391-KBX	CAP. CER 390 PF 500V +/-10% B	1	PC	C409
26-AIC391-KBX	CAP. CER 390 PF 500V +/-10% B	1	PC	C403
27-LCA104-JOX	CAP. P. E. 0.1UF 100V +/-5%	1	PC	C234
27-MBC104-JOX	CAP. M. P. E 0.1 UF 63V +/-5%	1	PC	C305
27-MBC224-JOX	CAP. M. P. E 0.22UF 63V +/-5%	1	PC	C611
27-MBC224-JOX	CAP. M. P. E 0.22UF 63V +/-5%	1	PC	C608
27-MBC224-JOX	CAP. M. P. E 0.22UF 63V +/-5%	1	PC	C620
27-MBC224-JOX	CAP. M. P. E 0.22UF 63V +/-5%	1	PC	C618
27-MBC473-KOX	CAP. M. PE 47NF 63V +/-10% 13076040	1	PC	C309
27-MCC104-JOX	CAP. M. P. E 0.1UF 100V +/-5%	1	PC	C410
27-MCC562-JOX	CAP. M. P. E 0.0056UF 100V+/-20%	1	PC	C422
27-PBC222-JOX	CAP. P. E 0.0022UF 63V +/-5%	1	PC	C306
28-AB0101-JCX	SMD. CAP 100 PF 50VDC +/-5%	1	PC	C001
28-AB0101-JCX	SMD. CAP 100 PF 50VDC +/-5%	1	PC	C002
28-AB0101-JCX	SMD. CAP 100 PF 50VDC +/-5%	1	PC	C103
28-AB0101-JCX	SMD. CAP 100 PF 50VDC +/-5%	1	PC	C107
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C951
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C219
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C212
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C201
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C917
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C228
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C233
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C239
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C024
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C020
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C019
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C017
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C005
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C082
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C102
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C105
28-AB0104-ZFX	CAP. SMD 0.1UF 50V +80%~-20% F	1	PC	C912
28-AB0104-ZFX	CAP. SMD 0.1UF 50V +80%~-20% F	1	PC	C910
28-AB0104-ZFX	CAP. SMD 0.1UF 50V +80%~-20% F	1	PC	C451
28-AB0104-ZFX	CAP. SMD 0.1UF 50V +80%~-20% F	1	PC	C285
28-AB0221-JCX	CAP. SMD 220PF 50V C 0603 +/-5%	1	PC	C204
28-AB0221-JCX	CAP. SMD 220PF 50V C 0603 +/-5%	1	PC	C014
28-AB0222-KBX	CAP. SMD 2200PF 50V +/-10% 0603	1	PC	C407
28-AB0222-KBX	CAP. SMD 2200PF 50V +/-10% 0603	1	PC	C213
28-AB0224-ZFX	CAP. SMD 0.22UF 50V +80-20%0603	1	PC	C614
28-AB0270-JCX	SMD. CAP 27 PF 50V +/-5% 0603	1	PC	C011
28-AB0300-JCX	SMD CAP. 30 PF 50V +/-5% 0603	1	PC	C022
28-AB0300-JCX	SMD CAP. 30 PF 50V +/-5% 0603	1	PC	C021
28-AB0472-KBX	CAP. SMD 4700PF 50V +/-10% 0603	1	PC	C619
28-AB0472-KBX	CAP. SMD 4700PF 50V +/-10% 0603	1	PC	C621
28-AB0822-KBX	SDM. CAP 8200 PF 50V +/-10% 0603	1	PC	C235
34-A220K0-1IX	COIL PL - 22UH +/-10% LGA0305-220K	1	PC	L080
34-A220K0-1IX	COIL PL - 22UH +/-10% LGA0305-220K	1	PC	L208
34-A330K0-1IX	COIL CHOKE 33UH +/-10%	1	PC	L102
34-A330K0-1IX	COIL CHOKE 33UH +/-10%	1	PC	L202
34-R100J2-OEX	COIL PL - 10 UH +/-5%	1	PC	L002
37-FBAT04-CAA1A	FBT BSC25-0252T	1	PC	T402
40-M123SP-MAK1X	P. C. B MAIN BD	1	PC	
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J207
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J006
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J017
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J018
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J020
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J203
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J202
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J201



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41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J1027
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J1025
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J1024
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J1023
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J1022
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J101
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J206
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J024
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J021
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J208
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J901
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J903
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J911
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J913
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J917
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J920
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J924
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J604
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J416
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J314
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J313
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J312
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J303
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J301
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J033
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J016
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J022
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J026
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J027
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J028
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J1026
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J209
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J211
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J414
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J602
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J305
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J309
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J311
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J401
18-FF0123-JGX	RES. M. O. 12K OHM 1W +/-5%	1	PC	J405
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J606
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J902
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J907
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J909
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J912
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J011
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J916
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J925
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	JP912
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	R299
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	D409
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J009
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J010
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J014
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J015
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J213
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J216
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J302
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J304
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J607
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J032
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J914
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J915

# BOM LIST

41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J923
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	JP103
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J029
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	R619
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J012
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J007
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J008
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J102
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J215
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J412
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J908
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	JP402
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	L402
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J031
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J013
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J024
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J025
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J918
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J919
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J922
41-WJ0200-B00	WIRE BARE JUMPER 20MM	1	PC	J023
41-WJ0200-B00	WIRE BARE JUMPER 20MM	1	PC	J214
45-OSC8M0-0Y0	CRYSTAL 8.0MHZ	1	PC	X001
45-SAWF18-590	SAW FILTER F1859	1	PC	Z101
46-12866W-02X	PIN BASE *2 S11-02Y	1	PC	P604
46-20598W-04X	PIN BASE *4 TJC1-4A	1	PC	P400 FOR DY COMECTOR
46-33079W-02X	PIN BASE *2 TJC3-2A	1	PC	P603
46-33079W-03X	PIN BASE *3 TJC3-3A	1	PC	P001
46-33079W-04X	PIN BASE *4 TJC3-4A	1	PC	P003
46-33079W-04X	PIN BASE *4 TJC3-4A	1	PC	P002 (PIN1-4)
46-33079W-04X	PIN BASE *4 TJC3-4A	1	PC	P904 (PIN (4) -PIN (7))
47-RCA040-XX0	RCA SOCKET AV-3, 2-9W-H	1	PC	P903
47-SVI002-XX0	Y/C SOCKET VERTICAL TYPE	1	PC	P902
62-227680-0UA	BRACKET ABS-KINGFA 606 (UO)	1	PC	FOR T402
62-227680-1UA	FBT BRACKET	1	PC	FOR T402
64-P30080-104	M/C SCREW P 3 X 8	1	PC	FOR IC301
64-P30100-104	M/C SCREW P 3 X 10	1	PC	FOR Q402
65-Z30050-23M	NUT M 3	1	PC	FOR IC301
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	4	PC	FOR T402
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	1	PC	FOR Q402
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	2	PC	FOR C406B
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	2	PC	FOR C421
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	2	PC	FOR L412
67-H27292-2A0	HEAT SINK	1	PC	FOR Q402
67-387190-1A0	HEAT SINK	1	PC	FOR IC601
67-H30752-3A0	HEAT SINK	1	PC	FOR IC301
19-AB0912-JTX	RES. SMD 9100 OHM 1/10W	1	PC	R414
09-55C8V2-DTX	SMD.DIODE BZV55-C8V2	1	PC	D217
09-55C8V2-DTX	SMD.DIODE BZV55-C8V2	1	PC	D218
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	2	PC	FOR L411
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D404
10-79C8V2-DBX	DIODE ZENER 8V2 1/2W 5%	1	PC	+TO GND, "-TO J405&R406
26-EBP680-JZX	CAP. CER 68PF 50V +/-5% SL TUBE	1	PC	FOR J405
T8-2131SGP-MSY	MSP BD ASSB	1	PC	
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q1001
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q1005
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q1006
13-MSP342-5GB	IC MSP 3425G	1	PC	IC1001
18-CB0101-JNX	RES. C.F. 100 OHM 1/6W +/-5%	1	PC	R1010
18-CB0333-JNX	RES. C.F. 33K OHM 1/6W +/-5%	1	PC	R1003
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	J1013
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	J1014
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R1001

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19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R1002
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R1011
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R1017
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R1014
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R1015
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R1016
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R1040
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R1018
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R1041
19-AB0391-JTX	SMD RES 390 OHM 1/10W 0603	1	PC	R1012
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C1015
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C1013
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C1009
25-BCB220-M1X	CAP. ELEC 22 UF 16V +/-20%	1	PC	C1042
25-BCB470-M1X	CAP. ELEC 47 UF 16V +/-20%	1	PC	C1038
25-BFB339-M1X	CAP. ELEC 3.3 UF 50V +/-20%	1	PC	C1010
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C1041
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C1040
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C1018
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C1019
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C1020
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C1021
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C1043
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C1034
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C1033
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C1031
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C1011
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C1006
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C1008
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C1012
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C1037
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C1039
28-AB0152-KBX	SMD. CAP 1500 PF 50V +/-10% B	1	PC	C1007
28-AB0220-JCX	CAP. SMD 22PF 50V +/-5% C	1	PC	C1035
28-AB0220-JCX	CAP. SMD 22PF 50V +/-5% C	1	PC	C1036
28-AB0222-KBX	CAP. SMD 2200PF 50V +/-10% 0603	1	PC	C1005
28-AB0339-CCX	SMD. CAP. 50V 3.3PF +/-0.25PF	1	PC	C1001
28-AB0339-CCX	SMD. CAP. 50V 3.3PF +/-0.25PF	1	PC	C1002
28-AB0471-JCX	CAP. SMD 470PF 50V +/-5% 0603	1	PC	C1025
28-AB0560-JCX	SMD CAP. 56 PF 50V +/-5% 0603	1	PC	C1004
34-A109K0-1IX	COIL CHOKE 1 UH +/-10%	1	PC	L1008
34-A109K0-1IX	COIL CHOKE 1 UH +/-10%	1	PC	L1003
34-A220K0-1IX	COIL PL - 22UH +/-10% LGA0305-220K	1	PC	L1001
34-R220J2-OEX	COIL PL - 22 UH +/-5%	1	PC	L1002
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J1008
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J1015
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J1011
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J1002
41-WJ0175-B00	WIRE BARE JUMPER 17.5MM	1	PC	J1006
41-WJ0200-B00	WIRE BARE JUMPER 20MM	1	PC	J1001
45-FIL4M5-0Y3	CER. FILTER LT4. 5MH	1	PC	X1002
45-OSC18M-4Y20A	CRYSTAL 18.432MHZ(CL=12PF)	1	PC	X1001
T8-2131SGP-PWY	POWER SUPPLY ASSB	1	PC	
09-BAS316-ATX	SMD. DIODE BAS316 115	1	PC	D840
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D820
10-0FR104-FBX	DIODE FR104 (FAST RECTIFIER)	1	PC	D812
10-ORL255-EBX	DIODE RL255 OR RL206 (POWER RECTIFIER)	1	PC	D804
10-ORL255-EBX	DIODE RL255 OR RL206 (POWER RECTIFIER)	1	PC	D803
10-ORL255-EBX	DIODE RL255 OR RL206 (POWER RECTIFIER)	1	PC	D802
10-ORL255-EBX	DIODE RL255 OR RL206 (POWER RECTIFIER)	1	PC	D801
10-ORU3AM-FBX	HIGH EFFICIENCY RECTIFIER RU3AM	1	PC	D833
10-ORU4YX-FOX	DIODE GRU4YX (FAST RECOVERY)	1	PC	D841
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D805

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10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D814
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D819
10-79C18V-DBX	DIODE ZENER 18V 1/2W 5%	1	PC	D821
10-79C7V5-DBX	DIODE ZENER 7V5 1/2W 5%	1	PC	D844
11-SA1015-YBX	TRANSISTOR ST2SA1015Y (PNP)	1	PC	Q801
11-SD2012-OCX	TRANSISTOR 2SD2012	1	PC	Q843
11-SK2645-OAX	TRANSISTOR 2SK2645-01MR (POWER	1	PC	Q815
12-BC847A-OBX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q802
12-BC847A-OBX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q841
12-BC847A-OBX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q844
12-BC847A-OBX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q845
13-000TL4-31T	IC TL431ACL	1	PC	IC803
13-0HPC92-2CP	PHOTO COUPLER HPC922-C	1	PC	IC802
13-TEA150-6TB	IC TEA1506T/N1 118	1	PC	IC801
18-CB0222-JNX	RES. C. F. 2.2K OHM 1/6W +/-5%	1	PC	R847
18-CD0101-JNX	RES. C. F. 100 OHM 1/4W +/-5%	1	PC	R813
18-CD0102-JNX	RES. C. F. 1K OHM 1/4W +/-5%	1	PC	R845
18-CD0222-JNX	RES. C. F. 2.2K OHM 1/4W +/-5%	1	PC	R817
18-CD0479-JNX	RES. C. F. 4.7 OHM 1/4W +/-5%	1	PC	R820
18-CD0560-JNX	RES. C. F. 56 OHM 1/4W +/-5%	1	PC	R801
18-CE0479-JNX	RES. C. F. 4.7 OHM 1/2W +/-5%	1	PC	R823
18-DE0823-FNX2	RES. M. F. 82K OHM 1/2W +/-1%	1	PC	R839
18-EF0229-JGX	RES. FUS. 2.2 OHM 1W +/-5%	1	PC	R843
18-FF0334-JGX	RES. M. O. 330K OHM 1W +/-5%	1	PC	R804
18-FG0229-JHX	RES. M. O. 2.2 OHM 2W +/-5%	1	PC	R852
18-KE0105-JN3	RES. H. VOLT. CC 1M OHM 1/2W +/-5%	1	PC	R802
18-KF0825-JHX	RES. GLASS GLAZE 8.2M OHM 1W	1	PC	R829
18-RG0108-JHX	RES. WIRE ROUND 0.1 OHM 2W +/-5%	1	PC	R815
19-AB0000-JTX	RES SMD 0 OHM 1/10W +/-5% 0603	1	PC	R824B
19-AB0100-JTX	RES SMD 10 OHM 1/10W +/-5%	1	PC	R814
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R844
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R825
19-AB0103-JTX	RES SMD 10K OHM 1/10W 0603	1	PC	R841
19-AB0122-JTX	SMD. RES 1.2K OHM 1/10 J 0603	1	PC	R811
19-AB0202-FTX	SMD. RES 2K OHM 1/10W +/-1% 0603	1	PC	R838
19-AB0222-JTX	RES SMD 2.2K OHM 1/10W 0603	1	PC	R848
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R836
19-AB0223-JTX	SMD. RES 22K OHM 1/10W +/-5% 0603	1	PC	R832
19-AB0223-JTX	SMD. RES 22K OHM 1/10W +/-5% 0603	1	PC	R846
19-AB0274-JTX	SMD. RES 270K OHM 1/10W +/-5% 0603	1	PC	R819
19-AB0332-JTX	SMD RES 3.3K OHM 1/10W 0603	1	PC	R812
19-AB0333-JTX	RES. SMD 33K OHM 1/10W 0603	1	PC	R818
19-AB0333-JTX	RES. SMD 33K OHM 1/10W 0603	1	PC	R837
19-AB0394-JTX	SMD. RES 390K OHM 1/10W +/-5%	1	PC	R822
19-AB0471-JTX	SMD. RES 470 OHM 1/10W +/-5%	1	PC	R821
19-AB0393-FTX	SMD. RES 39K OHM 1/10W +/-1%	1	PC	R842
19-AB0272-JTX	RES SMD 2.7K OHM 1/10W 0603	1	PC	R835
19-AB0683-JTX	RES SMD 68K OHM 1/10W 0603	1	PC	R826
22-NTC479-XX0	NTC 4.7 OHM +/-18% NTC4.7D2-14	1	PC	R803
22-PTC909-3A5	PTC 9 OHM	1	PC	RT801
25-BCA222-M1X	CAP. ELEC 2200 UF 16V +/-20%	1	PC	C843
25-BCB471-M1X	CAP. ELEC 470 UF 16V +/-20%	1	PC	C832
25-BCB471-M1X	CAP. ELEC 470 UF 16V +/-20%	1	PC	C845
25-BDB220-M1X	CAP. ELEC 22 UF 25V +/-20%	1	PC	C819
25-BDB220-M1X	CAP. ELEC 22 UF 25V +/-20%	1	PC	C850
25-BDB470-M1X	CAP. ELEC 47 UF 25V +/-20%	1	PC	C820
25-BFB109-M1X	CAP. ELEC 1 UF 50V +/-20%	1	PC	C847
25-BMJ151-M1X	CAP. ELEC 150 UF 400V +/-20%	1	PC	C806
25-PJG101-M1X	CAP. CELE 100UF/160V +/-20%	1	PC	C835
26-AIC221-KBX	CAP. CER 220 PF 500V +/-10% B	1	PC	C841
26-AIL103-KBX	CAP. CER 10NF 500V +/-10%	1	PC	C826
26-AIL103-KBX	CAP. CER 10NF 500V +/-10%	1	PC	C805
26-AKA221-KRX	CAP. CER 220 PF 1KV +/-10%	1	PC	C833

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26-AKA221-KRX	CAP. CER 220 PF 1KV +/-10%	1	PC	C809
26-AKA221-KRX	CAP. CER 220 PF 1KV +/-10%	1	PC	C815
26-APK222-MEX	CAP. CER 2200PF 400VAC +/-20% E	1	PC	C829
26-APK471-KBX	CAP. CER 470PF 400VAC +/-10% B	1	PC	C803
26-APK471-KBX	CAP. CER 470PF 400VAC +/-10% B	1	PC	C804
26-AQK472-ZFX	CAP. CER 4700PF 250VAC +80%-20% F	1	PC	C807
26-AQK472-ZFX	CAP. CER 4700PF 250VAC +80%-20% F	1	PC	C808
27-AQT474-MV3	CAP. M. PPO. 47UF275VAC +/-20%	1	PC	C801
27-MHM104-KOX	CAP. M. P. E 0.1 UF 400V +/-10%	1	PC	C802
28-AB0102-KBX	SMD. CAP 1000 PF 50V +/-10% B	1	PC	C839
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C425
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C417
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C844
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C831
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C842
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C814
28-AB0104-KBX	SMD. CAP 50VDC 0.1UF +/-10% 06	1	PC	C837
28-AB0221-JCX	CAP. SMD 220PF 50V C 0603 +/-5%	1	PC	C821
28-AB0224-ZFX	CAP. SMD 0.22UF 50V +80-20%0603	1	PC	C818
28-AB0471-KBX	SMD. CAP. 470PF 50V +/-10%	1	PC	C816
28-AB0471-KBX	SMD. CAP. 470PF 50V +/-10%	1	PC	C813
28-AB0473-KBX	SMD CAP 0.047UF 50V +/-10%0603	1	PC	C811
34-R101K2-1BX	COIL CHOKE 100 UH +/-10%	1	PC	L834
34-R220K2-1BX	COIL CHOKE 22 UH +/-10%	1	PC	L843
35-392170-00X	FERR. COIL BF-I35050C-683	1	PC	L833
35-LB1005-01X	FERR BEAD H75 (3.5X1X5)	1	PC	L840
35-LB1005-01X	FERR BEAD H75 (3.5X1X5)	1	PC	L815
36-LIF010-AX1	LINE FILTER	1	PC	T801
36-TRF198-AX0	TRANSFORMER CONV. BCK3532	1	PC	T803
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J806
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J811
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	JP805
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J822
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J810
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J815
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J816
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J817
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J818
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J819
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J820
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J821
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J802
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J809
41-WJ0125-B00	WIRE BARE JUMPER 12.5MM	1	PC	J805
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	R810
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J801
46-10962W-02X	PIN BASE *2 TJC2-2A	1	PC	P803
46-35063W-03X	PIN BASE *3 VH-3A	1	PC	P802
48-POW001-AX0	SWITCH POWER	1	PC	S801
50-03150D-1GS1	FUSE 3.15AT 250VAC 5MMX20MM	1	PC	F801
51-BC0243-0DN01	POWER CORD UL/SCA	1	PC	
63-W30100-AB4	S/T SCREW W 3 X 10 AB	1	PC	FOR Q815
64-P30080-104	M/C SCREW P 3 X 8	1	PC	FOR Q843
66-20516X-0B0	FUSE HOLDER	2	PC	FOR F801
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	4	PC	FOR T803 (1, 8, 9, 16)
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	3	PC	FOR RT801
66-343730-0B0	HOLLOW RIVET 1.6MMX3.0MMX3.2MM	1	PC	FOR Q815
66-343740-0B0	HOLLOW RIVET (2.3MMX4.0MMX3.5MM)	2	PC	FOR P803
66-343740-0B0	HOLLOW RIVET (2.3MMX4.0MMX3.5MM)	2	PC	FOR C806
67-H10918-4M2	HEAT SINK	1	PC	FOR Q843
67-H41341-2A0	HEAT SINK	1	PC	FOR Q815
67-M40068-1E4	CRT BRACKET	1	PC	FOR Q815
90-0DSTG1-SRIU	HEAT SINK DSTG-1	1	G	0.0003

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18-CB0103-JNX	RES. C.F. 10K OHM 1/6W +/-5%	1	PC	R853
18-CE0561-JNX	RES. C.F. 560 OHM 1/2W +/-5%	1	PC	R851
19-AB0223-JTX	SMD. RES 22K OHM 1/10W +/-5% 0603	1	PC	R831
11-CA8550-DBX	TRANSISTOR 8550D-T0-92(PNP)	1	PC	Q846
12-BC847A-0BX	SMD TRANSISTOR BC847A (NPN)	1	PC	Q847
T8-2131SGP-SIY	SIDE AV BD ASSB	1	PC	
40-C185N6-SIB1X	P.C.B. SIDE AV BD	1	PC	
41-WJ0050-B00	WIRE BARE JUMPER 5MM	1	PC	C960
41-WJ0050-B00	WIRE BARE JUMPER 5MM	1	PC	C961
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	R960
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	R961
46-30780H-04X	HS 4P 2468#24 390 TJC3-4Y/SCN-4Y	1	PC	P950(PIN(1)-PIN(4)) TO P904
47-RCA139-XX0	JACK RCA RCA317	1	PC	P1103
63-B30100-AB4	S/T SCREW B 3 X 10 AB	2	PC	MTG SIDE AV BD TO R. CAB
T8-2131SGP-SWY	SWITCH BD ASSB	1	PC	
02-IRR001-XX1	IR RECEIVER MODULE HRM380017	1	PC	IR011
14-LED05R-XX1	LED RED FB205	1	PC	D051C
18-CB0272-JNX	RES. C.F. 2.7K OHM 1/6W +/-5%	1	PC	R016A
18-CB0470-JNX	RES. C.F. 47 OHM 1/6W +/-5%	1	PC	R018A
25-BCB220-M1X	CAP. ELEC 22 UF 16V +/-20%	1	PC	C011A
40-21276H-IRC1X	P.C.B. SWITCH BD	1	PC	
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	R013A
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	J013
41-WJ0060-B00	WIRE BARE JUMPER 6MM	1	PC	J011
46-30783H-04X	HS UL #24 220 TJC3-4Y/SCN-4Y	1	PC	P002A(PIN(1)- PIN(4)) TO M. BD P002
62-346080-OHA	LED HOLDER	1	PC	
T8-2131SGP-PAN	PACKING ASSB	1	PC	
49-382380-BAT	BATTERY 7# (R03P AAA SUM-4)	2	PC	
75-DA31LL-CC1	POLYFOAM"LL"	1	PC	
75-DA31LR-CC1	POLYFOAM"LR"	1	PC	
75-DA31UL-CC1	POLYFOAM"UL"	1	PC	
75-DA31UR-CC1	POLYFOAM"UR"	1	PC	
T8-2131SGP-PANZ	PACKING ART DESIGN ASSB	1	PC	
72-2131GP-E001A	OPERATION MANUAL	1	PC	
74-022032-6WEAD	PLASTIC BAG	1	PC	FOR OPERATION MANUAL
74-120120-80HAA	POLYBAG W/SUFFOCATION WARNING	1	PC	
76-N21A31-0AT	CARTON BOX	1	PC	
T8-2131SGP-RCN	R. CAB ASSB	1	PC	
54-114000-00X	FELT TAPE (150MMX19MMX0.3MM)	7	PC	STICK ON REAR CAB.
59-130460-00X	RUBBER PAD (25MMX7MM)	2	PC	STICK ON R. CAB. (FOOTING)
62-314340-0UN	FBT SUPPORTER HIPS-KINGFA 113 (VO)	1	PC	
62-378080-1UN	TRACK	1	PC	FOR M. BD TRACK (R. CAB.)
62-389620-0UD	POWER LINE BLOCK	1	PC	
63-B30100-BT4	S/T SCREW B 3 X 10 BT	2	PC	MTG SIDE AV BD & R. CAB.
63-B40200-AB3	S/T SCREW B 4 X 20 AB	6	PC	MTG FRONT & REAR CAB.
63-F30100-BT3	S/T SCREW F 3 X 10 BT	2	PC	MTG RCA JACK & R. CAB
63-W30100-AB4	S/T SCREW W 3 X 10 AB	2	PC	MTG SUPPORTER & REAR CABINET
63-W30100-AB4	S/T SCREW W 3 X 10 AB	2	PC	MTG M. BD TRACK & REAR CABINET
T8-2131SGP-RCNZ	R. CAB ART DESIGN ASSB	1	PC	
55-D189RC-4CN5F	21189REARCABINET	1	PC	
58-2131MP-0UI1A	PLATE MODEL NO.	1	PC	
58-D106SI-3UI1G	INLAY SIDE AV	1	PC	
58-D192RI-KUI1B	INLAY REAR AV	1	PC	
T8-21RFLW-TS1GP	ASS'Y - MATCH TUBE	1	PC	
T8-2131SGP-CRY	CRT BD ASSB	1	PC	
10-1N4004-EBX	DIODE 1N4004 (RECTIFIER)	1	PC	D504
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D502
10-1N4148-ABX	DIODE 1N4148 (SWITCHING)	1	PC	D501
11-SA1015-YBX	TRANSISTOR ST2SA1015Y (PNP)	1	PC	Q510
11-TC3207-0BX	TRANSISTOR KTC3207	1	PC	Q503
11-TC3207-0BX	TRANSISTOR KTC3207	1	PC	Q502
11-TC3207-0BX	TRANSISTOR KTC3207	1	PC	Q501
18-CE0100-JNX	RES. C.F. 10 OHM 1/2W +/-10%	1	PC	R530

# BOM LIST

18-CE0105-JNX	RES. C.F. 1M OHM 1/2W +/-5%	1	PC	R529
18-CE0152-JNX	RES. C.F. 1.5K OHM 1/2W +/-5%	1	PC	R531
18-FE0272-JNX	RES. M.O. 2.7K OHM 1/2W +/-5%	1	PC	R514
18-FE0272-JNX	RES. M.O. 2.7K OHM 1/2W +/-5%	1	PC	R515
18-FE0272-JNX	RES. M.O. 2.7K OHM 1/2W +/-5%	1	PC	R516
18-FG0153-JHX	RES. M.O. 15K OHM 2W +/-5%	1	PC	R510
18-FG0153-JHX	RES. M.O. 15K OHM 2W +/-5%	1	PC	R511
18-FG0153-JHX	RES. M.O. 15K OHM 2W +/-5%	1	PC	R512
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R501
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R504
19-AB0101-JTX	RES SMD 100 OHM 1/10W 0603	1	PC	R507
19-AB0102-JTX	RES SMD 1K OHM 1/10W 0603	1	PC	R522
19-AB0272-JTX	RES SMD 2.7K OHM 1/10W 0603	1	PC	R524
19-AB0471-JTX	SMD. RES 470 OHM 1/10W +/-5%	1	PC	R527
19-AB0471-JTX	SMD. RES 470 OHM 1/10W +/-5%	1	PC	R526
19-AB0471-JTX	SMD. RES 470 OHM 1/10W +/-5%	1	PC	R525
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R502
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R505
19-AB0472-JTX	RES SMD 4.7K OHM 1/10W 0603	1	PC	R508
19-AB0561-JTX	RES SMD 560 OHM 1/10W 0603	1	PC	R523
19-AB0751-JTX	SMD. RES 750 OHM 1/10W 0603	1	PC	R503
19-AB0751-JTX	SMD. RES 750 OHM 1/10W 0603	1	PC	R506
19-AB0751-JTX	SMD. RES 750 OHM 1/10W 0603	1	PC	R509
25-BCB100-M1X	CAP. ELEC 10 UF 16V +/-20%	1	PC	C512
25-BCB221-M1X	CAP. ELEC 220 UF 16V +/-20%	1	PC	C508
25-BLA100-M1X	CAP. ELEC 10 UF 250V +/-20%	1	PC	C504
26-AMM102-KBX	CAP. CER 1000 PF 2KV +/-10% B	1	PC	C500
26-EBP103-ZF1	CAP CER 50V 2.5MM 10KpF -20%+80%	1	PC	C514
28-AB0103-KBX	SMD. CAP 0.01 UF 50V +/-10% 0603	1	PC	C507
28-AB0681-JCX	SMD. CAP 680 PF 50V +/-5% 0603	1	PC	C501
28-AB0681-JCX	SMD. CAP 680 PF 50V +/-5% 0603	1	PC	C502
28-AB0681-JCX	SMD. CAP 680 PF 50V +/-5% 0603	1	PC	C503
35-139730-00X	FERR. BEAD BF60	2	PC	FOR C514 (L505 & L506)
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J503
41-WJ0075-B00	WIRE BARE JUMPER 7.5MM	1	PC	J508
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J502
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J507
41-WJ0100-B00	WIRE BARE JUMPER 10MM	1	PC	J509
41-WJ0150-B00	WIRE BARE JUMPER 15MM	1	PC	J501
46-10967W-01X	PIN BASE *1 TJC1-1A	1	PC	P504
46-29355H-04X	HS 4P24 450 2(N) SCN-4Y	1	PC	FROM P502 TO M.BD P402
46-29356H-05X	HS 5P24 450 F/W 2* SCN-5Y	1	PC	FROM P501 TO P201
47-CRT022-AX0	SOCKET CRT	1	PC	P531
T8-21RFLW-FTS1GP	ASS'Y - MATCH TUBE(F.CAB)	1	PC	
44-21RFLW-TS1A	CRT A51ELD032X006	1	PC	
46-27688H-04X	HS 4P A/B 400/13 RBGW TJC1/4Y	1	PC	P400 FOR DY CONNECTOR (MAIN BD)
T8-21RFLW-MTS1GP	ASS'Y - MATCH TUBE(MAIN BD)	1	PC	
11-ST1803-ODX	TRANSISTOR ST1803DFH	1	PC	Q402
27-AHR334-JOX	CAP. M.PP 0.33 UF 400V +/-5%	1	PC	C421
27-ALR113-JOX	CAP. M.PP 0.011 UF 1.6KV +/-5%	1	PC	C406B
36-HDR029-XX0	TRANSFORMER HOR. DRIVE BCT-1012A	1	PC	T401
36-LIN500-XX1	COIL LINEARITY 50 UH	1	PC	L412
36-WID960-XX1	COIL WIDTH 96 UH	1	PC	L411
V8-TSM123-04M01	SOFTWARE CODE	1	PC	FOR IC201
V8-TSM123-04E01	SOFTWARE CODE	1	PC	FOR IC001

# Alignment Procedure

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## M123SP Alignment Procedure

### I . Summarize

M123SP, is NTSC only system model developed for NAFTA market specially. In trial run, burn the software to TMPA8872PSNG IC by OTP method. After the trial run, make the mask, please take care in production. To solve the probable problems in production, for the workers participate in alignment, please be familiar with the Alignment Procedure, and be master of the features.

There are 2 operation modes: user mode and factory mode. You can use the Remote control or buttons on the panel to operate in user mode, but only Remote control works in factory mode.

The way to enter factory mode: Press “D-MODE” button on RC, press “OK” and “CH+” “CH-” to select the parameter you want to adjust., Press “VOL+” “VOL-” to change the parameters. To quit factory mode, press “D-MODE” button (on the right of SURR button), the factory data changed will be memorized.

#### A few special modes:

Aging mode — used before the aging before alignment. The aging could start in factory mode.

Vertical stop mode—used to confirm the screen voltage. Press “INPUT” button in factory mode to enter Vertical stop mode. Then press “INPUT” button again to exit.

White balance alignment mode—used for white balance auto alignment. Press “BUS OFF” button near the left of MTS button to enter White balance alignment mode.

Factory mode—. Press “SOUND” button in factory mode to initialize the set. The screen displays “WAIT”, after the initialization, the screen displays “OK”, and exit the Factory mode automatically.

Then press “D-MODE” button again, it will not enable you to enter Factory mode if you want to enter again, you need operate as follows: turn down the volume to 0 press “Volume down” button on the panel, press “INFO” button on the RC meantime.

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## II. Alignment contents:

### 1. Adjustment of B+ voltage

Receive Philips standard testing pattern to RF input.

If the VR800 exists in the board, adjust it in STANDARD mode until voltage at following value:

Model	B+ (v)
20F512T 21185	$108 \pm 0.5$
20F420T 21K77	$108 \pm 0.5$
J13800/1	$106 \pm 0.5$
20V500T 21228	$110 \pm 0.5$
21A31	$108 \pm 0.5$
13V420T(14001)	$106 \pm 0.5$
20V412T 21266	$110 \pm 0.5$
14F512T PJO559	$105 \pm 0.5$

### 2. RF AGC adjustment

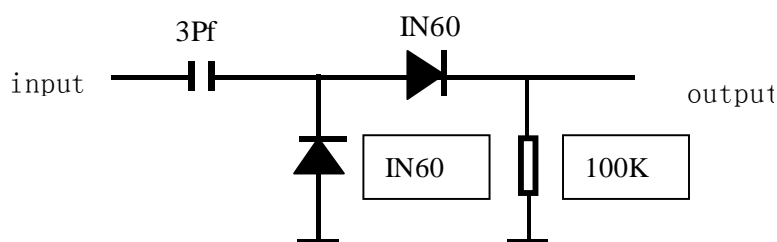
AGC Alignment Procedures:

- 1) Apply 8-scale gray signal (80dB), then adjust AGC data in D-mode to get the noise picture ( snow picture) disappear exactly. Test Pin 1 of TU101 (IF output) and record the voltage value as  $V_{1P-P}$ .  
<Illustrate as Picture A>
- 2) Apply 8-scale gray signal (80dB), and then adjust AGC data in D-mode until the synchronization signal distortion appear exactly. Test Pin 1 of TU101 (IF output) and record the voltage value as  $V_{2P-P}$ . <Illustrate as Picture A>
- 3) Calculate the value of  $V_{P-P}$  with the formula:  $V_{P-P} = (V_{2P-P} \times V_{1P-P})^{1/2}$   
Apply 8-scale gray signal (80dB), test Pin 1 of TU101 (IF output), adjust AGC data until the voltage of Pin 1 of TU101  $V_{P-P} = (V_{2P-P} \times V_{1P-P})^{1/2}$ .
- 4) Test three units according to 1), 2), 3) steps, and record the values of AGC in three units. Take the average value as benchmark.

Remarks:

Comparing test is necessary due to different probe of Oscilloscope and different Test Circuit (Picture A).

- 1) AGC voltage value should be tested afresh, due to the type/supplier of Tuner or Saw filter changed, or other related components changed.



(Picture A)

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### 3. Screen & Focus voltage adjustment

- ① Apply pattern signal in normal status, enter Factory mode, press “INPUT” button to stop vertical scan. **Note:** (the RC/GC/BC is preset to be 40, GD/BD is 40)
- ② Adjust the SCREEN switch on the flyback transformer to make a horizontal shining line just visible on the screen.
- ③ Turn on the vertical output, adjust the “FOCUS” on the flyback transformer to obtain the optimum focus.

### 4. White balance adjustment (NORMAL)

#### 1) Apply the black and white pattern in normal status;

#### 2) Alignment of normal color temperature

- ① Change Color Temperature to normal status
- ② Use a color analyzer to measure the black side of the screen. By changing the value of RC, GC and BC, set the reading of the color analyzer to **THOMSON** standard, **x=285±8, y=294±8**.
- ③ Use a color analyzer to measure the white side of the screen. By changing the value of GD, BD, set the reading of the color analyzer to **THOMSON** standard, **x=285±8, y=294±8**.
- ④ Separately set the brightness and contrast from min. to max., repeat the step 2 and 3 until the reading of the color analyzer is correct.

**Note:** Provided the production line is equipped with the self- White balance adjusting equipment, white balance can be adjusted automatically as following: Press “BUS OFF” button under factory mode, the TV set will adjust automatically.

**THOMSON** standard:

**Warm** X=310±8, Y=314±8

**Cool** X=278±8, Y=282±8

#### Remark:

1) Provided the production line is equipped with the self- White balance adjusting equipment, white balance of M123A chassis can be adjusted automatically as following: Press “I2C BUS” button under factory mode, the TV set will adjust automatically.

2) Free-alignment of warm and cool temperature by presetting the value of RC-W, GC-W, BC-W, GD-W, BD-W (for warm temperature) / RC-C, GC-C, BC-C, GD-C, BD-C (for cool temperature) into memory

### 5. Adjustment of Sub-brightness

Apply the Grey-scale/Color bar (NTSC signal) to the AV input, in normal status. Enter factory alignment menu 5, Select BRTC to adjust the sub-brightness, until that the 2<sup>nd</sup> dark bar of 8 level Grey scale just can be seen.

### 6. picture geometric adjustment

1. Apply the Philips standard testing pattern in normal status, then enter menu 3, adjusting the following data to get the min-distortion.

HPOS6 (Horizontal Center)	PARA6 (Level)	TRAP6 (Trapezia)
HSIZE6 (Horizontal Size)	CNRT6 (Top)	CNRB6 (Bottom)

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2. Apply the Philips standard testing pattern in normal status, then enter menu 3, adjusting the following data to get the min-distortion.

HIGH6 (Height)                      VP60 (Vertical Center)  
VLIN6 (Linearity)                  VSC6 (Vertical-S Correction)

#### 7. EHT/HEW ratio test (test with PC program) :

Instruments: EHT test meter, EHT test bar(1000:1), adjustable power supply, virtual DY( the same L value with CRT in production ).

Test means: Measure the EHT value V when Ib=0, HEW voltage value is V1(DC voltage at 2 ends of C431).

Check means: apply PC test means, V/V1 should satisfy the requirements below:

#### EHT/HEW ratio

Model	CRT	FBT	EHT(0Ua)(KV)	HEW(0Ua)(V)	RATIO
20F420T(21K77)	44-21RFLW-TS2A	37-FBAT04-CAA1A	28.5 ±2.5	21.57±1.66	1321±3%
J13800/1	44-14OFSN-CH3A	37-FAAT02-BAA1A	22.5±1.5	20.6±1.66	1092±3%
20V500T(21228)	44-21OFLN-SG6A	37-FBAT01-CAA6A	26.0±2.0	21.00±1.66	1238±3%
21A31	44-21RFLW-TS2A	37-FBAT04-CAA1A	28.5 ±2.5	21.57±1.66	1321±3%
13V420T(14001)	44-14OFSN-CH3A	37-FAAT02-BAA1A	22.5±1.5	20.6±1.66	1092±3%
20F512T(21185)	44-21RFLW-TS2A	37-FBAT04-CAA1A	28.5 ±2.5	21.57±1.66	1321±3%
20V412T(21266)	44-21OFLN-SG6A	37-FBAT01-CAA6A	26.0±2.0	21.00±1.66	1238±3%
14F512T(PJO559)	44-15RFLP-IR4A	37-FBA003-CAA1A	25.5±1.5	21.70±1.66	1175±3%

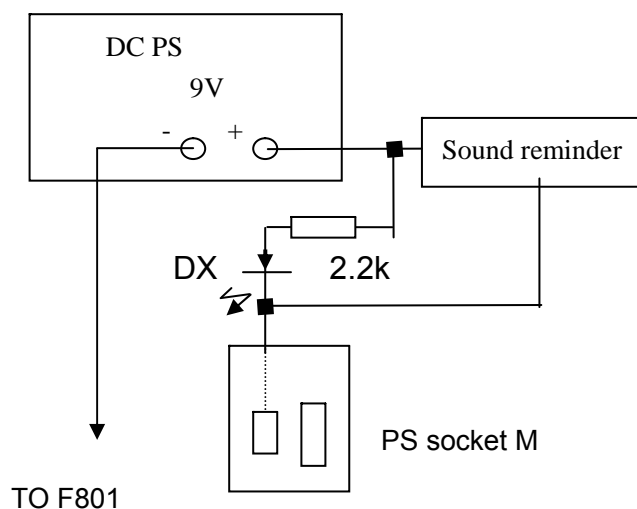
#### 8.X rays over voltage protecting circuit test :

TV enter working mode, apply more than 26V DC voltage between two ends of C431, the set should enter protecting mode, or check **X rays protecting circuit**.

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**9. PS line polarities test :**

Connect follow the graphic below:



Plug the PS line onto the PS socket M, then touch any pin of F801 with the probe, the LED DX will shine at the moment, with sound reminder, or it is disqualification.

**10. PS power test (Random test) :**

Instruments: Power meter.

Input signal pattern: Color bar, Sound 1KHZ , 100% modulation.

Input signal intensity:  $\geq 60\text{dBuV}$  (1 Mv rms)

Test points: find the graphic below

Test means: Set the Brightness, CR to the highest, adjust the volume to make the sound output to be 0.5W. Connect the power meter to test the power consumption. Transfer the set to be standby, and test the power consumption at the moment, which should meet the requirements below:

Model	Power	Standby power (110V)
20F420T(21K77)	85W $\pm$ 10%	<3W
J13800/1	65W $\pm$ 10%	<3W
21A31	85W $\pm$ 10%	<3W
13V420T(14001)	65W $\pm$ 10%	<3W
20V500T(21228)	75W $\pm$ 10%	<3W
20F512T(21185)	85W $\pm$ 10%	<3W
20V412T(21266)	75W $\pm$ 10%	<3W
14F512T(PJO559)	65W $\pm$ 10%	<3W

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**11. High voltage and Ib value limit test( random test )**

Instruments: High voltage meter, Ib meter.

Input signal pattern: White vertical

Input signal intensity: 60dBuv (1 Mv rms)

Test means: Connect High voltage meter and Ib meter. Test voltage of different Ib separately, It should meet the requirements below:

Model	Ib, Ib scope	Anode high voltage (Kv)	
		21"	
		Value	Diff.
20F420T(21K77)	Ib=50μA Scope: 50μA&1000μA	28.4±2.5	<2
J13800/1	....	22.5±2.0	<2
20V500T(21228)		26.0±2.0	<2
21A31	.....	28.4±2.5	<2
13V420T(14001)	.....	22.5±2.0	<2
20F512T(21185)	.....	28.4±2.5	<2
20V412T(21266)		26.0±2.0	<2
14F512T(PJO559)		25.5±2.0	<2

**12.Heater voltage test ( random test )**

Instruments : RMS voltage meter

Input signal pattern : Philips test graphic

Input signal intensity : 1 mVrms (60dBuV) to 50 mVrms

Connect the RMS voltage meter to the 2 ends of CRT glowers, test the heater voltage of highest CR and Brightness, It should meet:  $6.3 \pm 0.3$  Vrms**13. CCD and VOL-CHIP function test**

VOL-CHIP and CCD function test, please find the service manual in detail.

**14. Initialization**

Under the factory mode, press "SOUND" button, the screen displays "WAIT", when the screen displays "OK", the initialization finished. You can enter the next working procedure.

**15.EEPROM DATA:**

Note: the items with \* are adjustable, other items are not, pls do not adjust them;

Data Model	FAC 01					FAC 02					
	RC*	GC*	BC*	GD*	BD*	HIGH5	VP50	VLIN5	VSC5	VBLK5	VCEN5
20F512T 21185	40	40	40	40	40	22	06	0A	09	00	17
20F420T 21K77	40	40	40	40	40	2D	00	10	16	00	22
J13800/1	40	40	40	40	40	20	00	10	13	00	20
20V500T(21228)	40	40	40	40	40	20	00	10	13	00	20
21A31	40	40	40	40	40	2D	00	10	16	00	22
13V420T(14001)	40	40	40	40	40	20	00	10	13	00	20

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20V412T(21266)	40	40	40	40	40	20	00	10	13	00	20
14F512T(PJO559)	40	40	40	40	40	20	00	10	13	00	20

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Data	FAC 02					
Model	HIGH6*	VP60*	VLIN6*	VSC6*	VBLK6	VCEN6
20F512T 21185	26	00	10	13	00	25
20F420T 21K77	2E	00	10	17	00	23
J13800/1	21	00	10	13	00	24
20V500T(21228)	26	00	10	13	00	25
21A31	2E	00	10	17	00	23
13V420T(14001)	21	00	10	13	00	24
20V412T(21266)	26	00	10	13	00	25
14F512T(PJO559)	26	00	10	13	00	25

Data Model	FAC 03							
	HPOS6	U BLACK	V BLACK	STRAP F0	SIF FREQ	STRAP HL QG	PIF FREQ	NOISE DET
20F512T 21185	10	08	08	08	06	00	02	01
20F420T 21K77	0E	08	08	08	06	00	02	01
J13800/1	0F	08	08	08	06	00	02	01
20V500T(21228)	0F	08	08	08	06	00	02	01
21A31	0E	08	08	08	06	00	02	01
13V420T(14001)	0F	08	08	08	06	00	02	01
20V412T(21266)	0F	08	08	08	06	00	02	01
14F512T(PJO559)	0F	08	08	08	06	00	02	01

Data Model	FAC 04							
	CNTX	CNTN	BRTX	BR TN	COLX	COLN	TNTX	TNTN
20F512T 21185	7F	10	20	1B	7F	0E	2C	30
20F420T 21K77	7F	0D	30	1B	7F	0E	2C	30
J13800/1	55	0D	25	1B	7F	0E	2C	30
20V500T(21228)	7F	0D	30	1B	7F	0E	2C	30
21A31	7F	0D	30	1B	7F	0E	2C	30
13V420T(14001)	55	0D	25	1B	7F	0E	2C	30
20V412T(21266)	7F	0D	30	1B	7F	0E	2C	30
14F512T(PJO559)	50	0D	25	1B	7F	0E	2C	30

Data Model	FAC 05							
	BRTC*	COLC	COLP	SCOL	SCNT	CNTC	TNTCT	TNTCV
20F512T 21185	48	38	00	07	0F	3A	45	45
20F420T 21K77	3C	38	00	07	0F	3A	58	3D

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# TCL-THOMSON Electronics R&D Center (Shen'Zhen Lab)

J13800/1	3C	38	00	07	0F	3A	58	3D
20V500T(21228)	3C	38	00	07	0F	3A	58	3D
21A31	3C	38	00	07	0F	3A	58	3D
13V420T(14001)	3C	38	00	07	0F	3A	58	3D
20V412T(21266)	3C	38	00	07	0F	3A	58	3D
14F512T(PJO559)	3C	38	00	07	0F	29	58	3D

Data Model	FAC 06						
	ST3	SV3	SV4	SVD	ASSH	SHPX	SHPN
20F512T 21185	1B	1B	1B	1B	07	1A	1A
20F420T 21K77	1B	1B	1B	1B	07	1A	1A
13800/1	1B	1B	1B	1B	07	1A	1A
20V500T(21228)	1B	1B	1B	1B	07	1A	1A
21A31	1B	1B	1B	1B	07	1A	1A
13V420T(14001)	1B	1B	1B	1B	07	1A	1A
20V412T(21266)	1B	1B	1B	1B	07	1A	1A
14F512T(PJO559)	1B	1B	1B	1B	07	1A	1A

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Data Model	FAC 07							
	MOD1	MOD2	MOD3	OPT	OPTM1	OPTM2	HDCNT	HSTOP
20F512T 21185	70	30	80	37	C2	81	09	FF
20F420T 21K77	60	30	80	37	C4	C1	09	FF
J13800/1	60	00	80	37	C4	C1	09	FF
20V500T(21228)	60	30	80	37	C4	81	09	FF
21A31	60	30	80	37	C2	C1	09	FF
13V420T(14001)	60	10	80	37	C4	C1	09	FF
20V412T(21266)	60	30	80	37	C4	81	09	FF
14F512T(PJO559)	70	30	80	37	C2	81	09	FF

Data Model	FAC 08							
	RFAGC*	BRTS	OSD	OSDF	CCD OSD	CCD OSDF	TXCN	RGCN
20F512T 21185	25	00	21	53	4A	65	1F	16
20F420T 21K77	25	00	21	53	4A	65	1F	16
J13800/1	25	00	21	53	4A	65	1F	16
20V500T(21228)	25	00	21	53	4A	65	1F	16
21A31	25	00	21	53	4A	65	1F	16
13V420T(14001)	25	00	21	53	4A	65	1F	16
20V412T(21266)	25	00	21	53	4A	65	1F	16
14F512T(PJO559)	25	00	21	53	4A	65	1F	16

Data Model	FAC 09								
	V01	V05	V10	V25	V50	V75	V90	V100	VOLMAX
20F512T 21185	35	48	53	60	66	68	6A	6D	32
20F420T 21K77	0D	15	27	41	51	5F	6C	6F	32
J13800/1	0D	15	27	41	51	5F	6C	6F	32
20V500T(21228)	0D	15	27	41	51	5F	6C	6F	32
21A31	35	48	53	60	66	68	6A	6D	32
13V420T(14001)	0D	15	27	41	51	5F	6C	6F	32
20V412T(21266)	0D	15	27	41	51	5F	6C	6F	32
14F512T(PJO559)	35	48	53	60	66	68	6A	6D	32

Data Model	FAC 10								
	CURTCEN	VOLX	PWTM	MODE4	MODE5	MODE6	MODE7	MODE8	MODE9
20F512T 21185	A5	7F	08	22	0B	1E	47	2D	CA
20F420T 21K77	A5	7F	08	22	0B	1E	47	2D	CA

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J13800/1	A5	7F	08	22	0B	1E	47	2D	02
20V500T(21228)	A5	7F	08	22	0B	1E	47	2D	CA
21A31	A5	7F	08	22	0B	1E	47	2D	CA
13V420T(14001)	A5	7F	08	22	0B	1E	47	2D	C2
20V412T(21266)	A5	7F	08	22	0B	1E	47	2D	CA
14F512T(PJO559)	A5	7F	08	22	0B	1E	47	2D	CA

Data Model	FAC 11						
	CON1	CON2	CON3	STSADJ	ALI 1	ALI 2	ALI3
20F512T 21185	06	06	02	00	0A	0A	03
20F420T 21K77	06	06	02	00	0A	0A	03
J13800/1	06	06	02	00	0A	0A	03
20V500T(21228)	06	06	02	00	0A	0A	03
21A31	06	06	02	00	0A	0A	03
13V420T(14001)	06	06	02	00	0A	0A	03
20V412T(21266)	06	06	02	00	0A	0A	03
14F512T(PJO559)	06	06	02	00	0A	0A	03

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Data Model	FAC 12							
	SVM	SVM1	OSD2	OSDF2	PYNX	PYNN	PYXS	PYNS
20F512T 21185	10	10	20	64	28	18	22	10
20F420T 21K77	10	10	20	64	28	18	22	10
J13800/1	10	10	20	64	28	18	22	10
20V500T(21228)	10	10	20	64	28	18	22	10
21A31	10	10	20	64	28	18	22	10
13V420T(14001)	10	10	20	64	28	18	22	10
20V412T(21266)	10	10	20	64	28	18	22	10
14F512T(PJO559)	10	10	20	64	28	18	22	10

Data Model	FAC 13						
	CLTM	CLVO	CLVS	ABL	DCBS	FLG0	FLG1
20F512T 21185	04	03	03	27	14	82	0C
20F420T 21K77	04	03	03	27	14	82	0C
J13800/1	04	03	03	27	14	82	0C
20V500T(21228)	04	03	03	27	14	82	0C
21A31	04	03	03	27	14	82	0C
13V420T(14001)	04	03	03	27	14	82	0C
20V412T(21266)	04	03	03	27	14	82	0C
14F512T(PJO559)	04	03	03	27	14	82	0C

Data Model	FAC 14							FAC 15				
	HAFC	AGCC	NOIS	ONTM	NSHP	PVLVL	PLMT	RC-C	GC-C	BC-C	GD-C	BD-C
20F512T 21185	09	1C	01	08	1A	80	80	--	--	--	--	--
20F420T 21K77	09	1C	01	08	1A	80	80	00	00	00	00	00
J13800/1	09	1C	01	08	1A	80	80	00	00	00	00	00
20V500T(21228)	09	1C	01	08	1A	80	80	--	--	--	--	--
21A31	09	1C	01	08	1A	80	80	00	00	00	00	00
13V420T(14001)	09	1C	01	08	1A	80	80	00	00	00	00	00
20V412T(21266)	09	1C	01	08	1A	80	80	--	--	--	--	--
14F512T(PJO559)	09	1C	01	08	1A	80	80	--	--	--	--	--

Data Model	FAC 16							FAC 17			
	RC-W	GC-W	BC-W	GD-W	BD-W	YUVGC	YUVBC	D-COL	D-BRI	D-CON	D-SHP
20F512T 21185	--	--	--	--	--	--	--	32	32	5A	32
20F420T 21K77	00	00	00	00	00	00	00	32	32	5A	32
J13800/1	00	00	00	00	00	00	00	32	32	5A	32
20V500T(21228)	--	--	--	--	--	--	--	32	32	5A	32

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21A31	00	00	00	00	00	00	00	32	32	5A	32
13V420T(14001)	00	00	00	00	00	00	00	32	32	5A	32
20V412T(21266)	--	--	--	--	--	--	--	32	32	5A	32
14F512T(PJO559)	--	--	--	--	--	--	--	32	32	5A	32

Data Model	FAC 18				FAC 19			
	S-COL	S-BRI	S-CON	S-SHP	M-COL	M-BRI	M-CON	M-SHP
20F512T 21185	32	32	32	32	32	32	1E	32
20F420T 21K77	32	32	32	32	32	32	1E	32
J13800/1	32	32	32	32	32	32	1E	32
20V500T(21228)	32	32	32	32	32	32	1E	32
21A31	32	32	32	32	32	32	1E	32
13V420T(14001)	32	32	32	32	32	32	1E	32
20V412T(21266)	32	32	32	32	32	32	1E	32
14F512T(PJO559)	32	32	32	32	32	32	1E	32

Data Model	FAC 20								
	SEG-POINT1	SEG-POINT2	DATA-VL	DATA-VH	DATA-UF	SPE-POS1	SPE-DATA1	SENSI-ON	SENSI-OFF
20F512T 21185	173	407	01	02	08	06	05	00	00
20F420T 21K77	173	407	01	02	08	06	05	00	00
J13800/1	173	407	01	02	08	06	05	00	00
20V500T(21228)	173	407	01	02	08	06	05	00	00
21A31	173	407	01	02	08	06	05	00	00
13V420T(14001)	173	407	01	02	08	06	05	00	00
20V412T(21266)	173	407	01	02	08	06	05	00	00
14F512T(PJO559)	173	407	01	02	08	06	05	00	00

Data Model	FAC 21					
	THEATER-BAS	THEATER-TRE	CONCERT-BAS	CONCERT-TRE	BROADCAST-BAS	BROADCAST-TRE
20F512T 21185	2D	4A	38	3E	19	2C
20F420T 21K77	2D	4A	38	3E	19	2C
J13800/1	2D	4A	38	3E	19	2C
20V500T(21228)	2D	4A	38	3E	19	2C
21A31	2D	4A	38	3E	19	2C
13V420T(14001)	2D	4A	38	3E	19	2C
20V412T(21266)	2D	4A	38	3E	19	2C
14F512T(PJO559)	2D	4A	38	3E	19	2C

	FAC 22
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Model	VOL_MAI	GATE	VOL-OUT	AV GAIN	OPTM3
20F512T 21185	03	2A	75	2D	48
20F420T 21K77	03	2A	75	2D	48
J13800/1	03	2A	75	2D	48
20V500T(21228)	03	2A	75	2D	48
21A31	03	2A	75	2D	48
13V420T(14001)	03	2A	75	2D	48
20V412T(21266)	03	2A	75	2D	48
14F512T(PJO559)	03	2A	75	2D	48

Data	FAC 25					
Model	G2_FLAG00	G2_FLAG01	G2_FLAG02	G2_FLAG03	G2_FLAG04	G2_FLAG05
20F512T 21185	30	06	00	02	00	00
20F420T 21K77	30	06	00	02	00	00
J13800/1	30	06	00	02	00	00
20V500T(21228)	30	06	00	02	00	00
21A31	30	06	00	02	00	00
13V420T(14001)	30	06	00	02	00	00
20V412T(21266)	30	06	00	02	00	00
14F512T(PJO559)	30	06	00	02	00	00

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## III. CDRH Document :

## 1. Testing for EHT and HEW

Model	CRT	FBT	EHT(0Ua) (KV)	HEW(0Ua) (V)	RATIO
20F420T(21K77)	44-21RFLW-TS2A	37-FBAT04-CAA1A	28.5 ±2.5	21.57±1.66	1321±3%
J13800/1	44-14OFSN-CH3A	37-FAAT02-BAA1A	22.5±1.5	20.60±1.66	1092±3%
20V500T(21228)	44-21OFLN-SG6A	37-FBAT01-CAA6A	26.0±1.5	21.00±1.66	1238±3%
21A31	44-21RFLW-TS2A	37-FBAT04-CAA1A	28.5 ±2.5	21.57±1.66	1321±3%
13V420T(14001)	44-14OFSN-CH3A	37-FAAT02-BAA1A	22.5±1.5	20.60±1.66	1092±3%
20F512T(21185)	44-21RFLW-TS2A	37-FBAT04-CAA1A	28.5 ±2.5	21.57±1.66	1321±3%
20V412T(21266)	44-21OFLN-SG6A	37-FBAT01-CAA6A	26.0±1.5	21.00±1.66	1238±3%
14F512T(PJO559)	44-15RFLP-IR4A	37-FBA003-CAA1A	25.5±1.5	21.70±1.66	1175±3%

## 2. Value of Sample Register in X-ray protection circuit

Model	BOM	CRT	Designator	value
20F420T(21K77)	03-DK77AGP-TU23	44-21RFLW-TS2A	R433/R436	470 Ω /120 Ω
J13800/1	03-EV13AGP-TU00/1	44-14OFSN-CH3A	R433/R436	470 Ω /100 Ω
20V500T(21228)	03-D228AGP-TU23	44—21OFLN-SG6A	R433/R436	680 Ω /100 Ω
21A31	03-DA31AGP-TU26W	44-21RFLW-TS2A	R433/R436	470 Ω /120 Ω
13V420T(14001)	03-E001AGP-TU23W	44-14OFSN-CH3A	R433/R436	470 Ω /100 Ω
20F512T(21185)	03-D185AG-TU60	44-21RFLW-TS2A	R433/R436	470 Ω /120 Ω
20V412T(21266)	03-D266AGP-TU23W	44-21OFLN-SG6A	R433/R436	680 Ω /100 Ω
14F512T(PJO559)	03-F559AGP-TU23W	44-15RFLP-IR4A	R433/R436	470 Ω /82 Ω

## 3. Test of X-ray protection circuit

( X-ray protection circuit will not work with normal voltage, or it does work with over-load voltage)

Model	BOM	CRT	Designator	Normal Voltage	over-load voltage
20F420T(21K77)	03-DK77AGP-TU23	44-21RFLW-TS2A	C431	21±1.0	>26V
J13800/1	03-EV13AGP-TU00/1	44-14OFSN-CH3A	C431	20.6±1.0	>26V
20V500T(21228)	03-D228AGP-TU23	44-21OFLN-SG6A	C431	21±1.0	>26V
21A31	03-DA31AGP-TU26W	44-21RFLW-TS2A	C431	21±1.0	>26V
13V420T(14001)	03-E001AGP-TU23W	44-14OFSN-CH3A	C431	20.6±1.0	>26V
20F512T(21185)	03-D185AG-TU60	44-21RFLW-TS2A	C431	21±1.0	>26V
20V412T(21266)	03-D266AGP-TU23W	44-21OFLN-SG6A	C431	21±1.0	>26V
14F512T(PJO559)	03-F559AGP-TU23W	44-15RFLP-IR4A	C431	21.7±1.0	>26V

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